FINAL REPORT

ECONOMIC ANALYSIS OF THE VALUES OF SURFACE USES OF STATE LANDS

TASK 4
FAIR MARKET VALUE FOR CROPLAND LEASES

John Duffield
Bruce Anderson

Report for Montana Department of State Lands
February 1993

Bioeconomics, Inc.

Contact: Bioeconomics, Inc. 250 Station Drive, Missoula, Montana 59801

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ACKNOWLEDGEMENTS

We are indebted to a number of individuals who contributed time and thought to this study. We appreciated the patient, professional and courteous help of the Montana Agricultural Statistics Service staff. We are especially indebted to Jim Sands, Curt Lund, and Steve Susemihl for overseeing the cropland survey effort and for responding to numerous data requests. Steve Susemihl programmed the cropland survey instrument. We thank Jon Souder for help with our literature review and for sharing his insights into policies in other states. We appreciated the assistance provided by Jeff Hagener and Gregory Hallsten in making data available from Department of State Lands files and for helping coordinate the survey effort. We also appreciated the cooperation of the commissioners and staff of the other western state land commissioner offices who participated in our survey and responded to data requests. Keith Kuhlman of Oklahoma and Linda Kehling and John Wurdeman of Nebraska were particularly helpful. Dr. Patrick Jobes implemented the pilot cropland survey. We would like to acknowledge our appreciation for the hard work put in by our approximately 20 telephone survey operators. These surveys were generally implemented in the evening or on weekends. While too numerous to list, our enumerators' professional and timely implementation of the cropland survey was central to fulfilling our study objectives. We are likewise grateful to the over 1000 Montana farmers who were kind enough to participate in the sometimes lengthy phone interviews. Finally, we appreciated the careful and timely review of our draft that was provided by Dr. Allen Bjergo, Dr. Thomas Power and Dr. David Patterson. The authors are solely responsible for the interpretations made here or for any remaining errors.

PROJECT PARTICIPANTS AND AFFILIATION

A. Survey Design, Analysis and Report Writing.

John Duffield. Ph.D. Economics, Professor of Economics, University of Montana, 1974-present. Senior economist, Bioeconomics, Inc., 1988-present. Project director, author or co-author all reports.

Bruce Anderson. M.S. Hydrology, Computer specialist/Scientist, Bioeconomics, Inc., 1992-present. Data base management, computation, analysis, report writing grazing and cropland studies.

Chris Neher. M.A. Economics, Economist, Bioeconomics, Inc., 1989-present. Data base management, survey supervision, computation, report writing, recreation and outfitter studies.

Jim Boyer. M.S. Urban Planning, economic consultant, survey of western state land managers, report writing.

B. Reviewers and Survey Design

Jim Almond. M.A. Economics, 27-years experience ag. credit banker, manager family ranch in Hysham, chairman Tax and Finance Committee National Cattleman's Assoc. Survey design and review grazing study.

Allen Bjergo. Ph.D. Economics, MSU cooperative extension service. Survey design and review cropland study.

John Hansen, M.S. Range Science, range scientist with Rangehands, Inc. Survey design and review of grazing study. Implemented pilot grazing survey.

Daniel Hellerstein. Ph.D. Economics, Economic Research Service (Washington, D.C.). Survey design and review recreation study.

David Patterson. Ph.D. Statistics. Assoc. Professor Department of Mathematical Sciences, University of Montana. Review of statistical content of all reports, consultation on procedures.

Thomas Power. Ph.D. Economics, Professor and Chair Department of Economics, University of Montana. Review all studies.

Brian Sindelar. Ph.D. Range Ecology, formerly professor of range management MSU, currently scientist with Rangehands, Inc. Survey design and review grazing study. Implemented pilot grazing survey.

Thomas Stevens, M.A.I., appraiser, Missoula, MT. Review of cabin lease study.

TABLE OF CONTENTS

REFERENCES

APPENDIX A. Memorandum of Understanding: Montana Department of State Lands & Montana Agricultural Statistics Service (August 26, 1992)

APPENDIX B. Pilot Cropland Phone Survey Instrument (July 1992)

APPENDIX C. Final Report, Cropland Lease Pre-Survey, Dr. Patrick Jobes (August, 1992)

APPENDIX D. Mailing to Cropland Survey Sample from Montana Agricultural Statistics (September 22 1992).

APPENDIX E. Final Phone Survey Instrument, Cropland Survey (September 1992).

APPENDIX F. Competitive Bids, Revenues, and Acreage for State Cropland Leases.

APPENDIX G. District FIPS Codes

APPENDIX H. Variable List for Cropland Database.

APPENDIX I. Logit Analysis for Willingness to Pay for Control of Public Access.

LIST OF TABLES

LIST OF TABLES (Cont'd)

LIST OF FIGURES

EXECUTIVE SUMMARY

This report examines the fair market value for cropland leases on state school trust lands in Montana.

Montana leases approximately 560,000 acres for crop production. In 1992, the state received $8.7 million in revenues for the beneficiaries of the school trust. Revenues from crop leases have fluctuated from year to year, a result of variable yields and market prices for agricultural commodities. For example, revenues were about $9 million in FY 1988, but only $5 million in FY 1989. Montana crop leases are primarily for production of wheat (about 70% of all acreage), barley (about 12%), and alfalfa hay (5%). The remainder is in the Conservation Reserve Program (CRP). In 1992, the state averaged about $15.50 an acre for its cropland leases.

In Montana as well as in other states, the management objectives for cropland leases are the same as for the grazing lands. States generally strive to maximize revenues for the school trust and other designated beneficiaries, while protecting the long-term well-being of the state land resource. More than is the case with grazing leases, states appear to achieve close to full market value for their cropland leases. State leasing systems for cropland are either cash rents or crop shares. Cash rent is a fixed annual payment to the state usually based on a fee per acre. Crop share can either be a percentage of the crop produced or a percentage of the gross sales from a state parcel. The state of Montana's minimum share for cropland leases has been at 25% for many years. Only about 10 percent of all leases receive competitive bids, so the average contract crop share is about 26 percent.

The central question examined in this report is whether the current cropshare system returns a "full market value" to the school trust as required by the Montana Enabling Act of 1889 and by the Montana Constitution of 1972. There are two aspects to this question. The first is whether the state's 25 percent minimum cropshare is the fair market level for cropshare. Secondly, since the Department of State lands does not closely monitor the actual production and revenues on its crop leases, there is the question of whether farmers actually provide the state with its contract average of about 25% of production under this "honor system".

In order to identify the fair market value for cropland leases, we undertook an extensive survey of Montana farmers. This survey of 1500 Montana farmers was administered by the Montana Agricultural Statistics Service in September-November 1992. The survey was conducted by phone following a mailing of a cover letter and key survey questions. The completion rate was 72% (1024 completed surveys) which is high for a phone survey. The survey instrument was designed to collect information on private and public cropland lease rates and the important characteristics of each lease including services provided and other terms.

Four approaches were taken to identifying a fair market value for cropland leases. These are summarized in Table S-1. Each of these is described in turn, along with our findings with regard to the average cropshare for dryland private market cropshare leases.

A total of 471 private leases and 116 state leases were identified in the survey. About 31% of private leases were on a dollar per acre basis. The average private market lease rate was found to be $37.68 per acre with a range of $2.10 to $200.00. About 55% of private leases were on a cropshare basis. The most typical private market cropshare was found to be 33% with a range of 5% to 75% (Figure S-1). Almost 60% of all leases were at a one-third cropshare; the other most common cropshares were one-quarter (20% of the sample) and one-half (6% of the sample). In other words, the great majority of private cropshare contracts (a total of 83% of all contracts) were at either one-quarter, one-third or one-half landlord shares.

To summarize with regard to the private market reference price (Table S-1), the cropshare market is dominated by a single price: the one-third cropshare. It may be noted that in the Department of State Lands surface management regulations, it is stated that the cropshare rental basis shall be "not less than one-fourth of annual crops to the state or the usual landlord's share prevailing in the district, whichever is greater". Other things equal, it appears that the usual landlord's share in most of the state is one-third. As noted in the main report (Table 4-12), about one-third or higher is also the cropshare in all of the Agricultural Statistics Service districts for Montana.

One way to identify the cropshare that may be more specific to state lands is to estimate the mean cropshare for private leases with terms most similar to those on state lands. This is shown as method 1) in part B. of Table S-1. For private market leases with no services, on dryland, and with terms greater than five years, the mean cropshare is actually greater than one-third (35.7%) though the most typical value for these leases is again one-third.

Another approach to estimating a cropshare specific to state lands was based on a statistical model (a so-called "hedonic model") that related lease characteristics and terms to cropshare for private market cropland leases. This model proved to be unsuccessful in explaining cropshare in terms of services or lease characteristics; only variables for location proved to be important. The implied base rate for predicted fair market value of state leases would be with average adjustments for location is 32.6% cropshare. Predicted cropshare rates were about 10% higher for districts 10 and 70 (Northwest and Southwest Montana).

A third approach is to examine the cropshare received by the state on the cropland leases for which there is competitive bidding. The state reports a total 224 leases for which there are competitive bids; the average of these bids is 32.9%. There is no evidence that the croplands that receive competitive bids are different from other state cropland sections in terms of services. Accordingly, the average competitive bid provides another measure of the market value of cropland leases. The reason that most leases do not receive competitive bids is neighbor relations. Only about 25% of respondents reported that they would bid on a neighbor's state land lease, even if it would fit well in their operation.

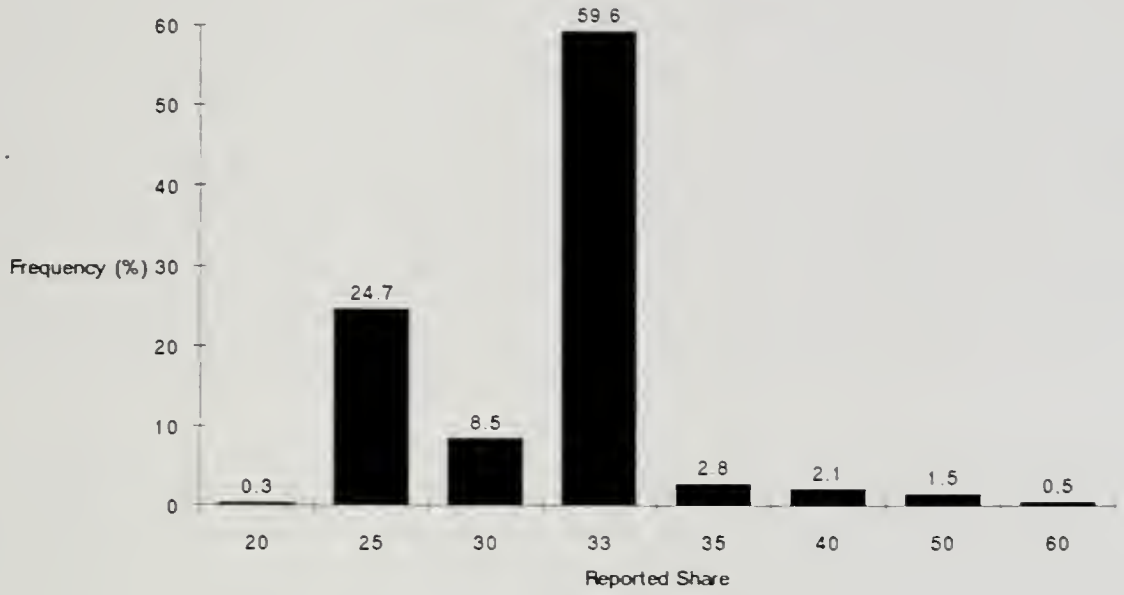
Table S-1. Summary of alternative estimates of fair market value for Montana state lands cropland leases.

Estimate	Mean Cropshare	Median Cropshare	Sample Size
A. Private market reference prices			
Dryland private market	32.9	33.0	211
B. Estimates of fair market value for Montana state cropland leases			
1.Dryland private resembling state (no services, terms > 5years).	35.7	33.0	29
2. Hedonic model, statewide average for state leases.	32.6	32.0	95
3. Competitively bid state leases	32.9	----	224
4. Farmer "reported" fair price for dryland state lease			
- All farmers	30.68	33.0	835*
- State leaseholders	27.74	30.0	124*

* number of responses for two primary crop types in the area.

A fourth approach was to ask farmers what they thought was a "fair price" for state cropland leases. First respondents were asked the "average charge" for privately owned irrigated and non-irrigated land in "your area". The reported averages were 32% and 33.6% respectively. When asked if these going rates would be fair prices for state school trust cropland leases, over 80% said "yes". The weighted average farmer "reported" fair price for dryland state leases for all farmers is a mean of 31% and a median of 33%; the fair price for respondents holding state leases was 28% and a median of 30%. All four of the approaches suggest that the fair market cropshare rental on state leases should be about one-third. The lowest median value suggested by any of the approaches is 30%; this is for the farmer's judgemental "fair share" for state leases where it is just the subsample of state leaseholders. We suggest that the evidence points toward a fair market share for state cropland leases of one-third.

Figure S-1. Reported private cropshare rates.

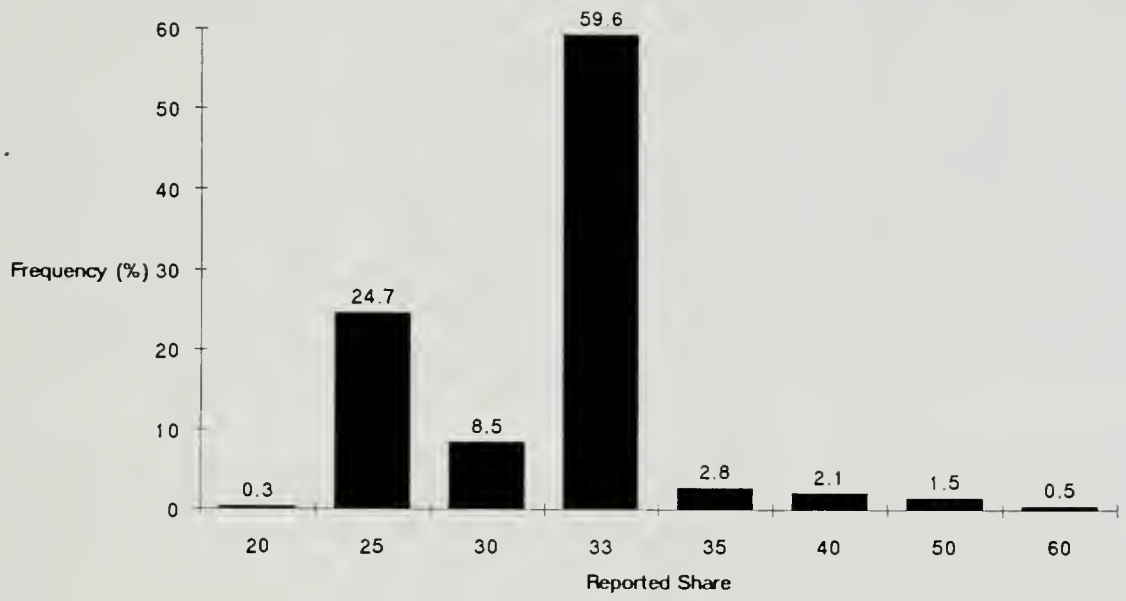


A final objective of this analysis was to assess whether the state is receiving the 25% share of crop production. In dryland farming regions such as Montana, states tend to use the "honor system" to obtain their shares of crop production or gross sales. Because most leaseholders farm more than just a state parcel, it is difficult to segregate production from state lands from a farmer's total production. Montana and Washington cite the inability to effectively monitor production on state parcels as a major shortcoming of crop sharing.

As the cropshare for the state has remained unchanged at 25% since before the 1950's, it was anticipated that the long term ratio of state revenues to value of production for state agricultural leases should approximate 0.25 if the cropshare system has been functioning well. As a means of testing this hypothesis, state cropping patterns and yields were first characterized, and values of production were calculated by crop type and summed. Given an historical data set, the revenues received from state agricultural leases was regressed on the previous year's estimated total value of production for these leases.

The 1992 survey provided information on cropping patterns on state leases for that year. In the absence of other information, it was assumed that that cropping pattern (70% wheat, etc.) held into the past. A key assumption is that the percent of land in summer fallow (39%) in 1992 also holds in the past. Yields (bushels per acre) were reported for state leases in our 1992 survey. These yields were somewhat below (about 80%) of yields reported by Montana Agricultural Statistics for all Montana production in 1992. Since we do not have an historical record of state lands yields, we report two approaches in Table S-2. The first is to assume state lands yields are the same as all Montana lands. This leads to probably conservative

Figure S-1. Reported private cropshare rates.



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"honor system" cropshares estimates. The second approach is to use the approximately 80% of state lands yields to all Montana lands yields observed in 1992 to adjust historical all Montana yields (second column of Table S-2). There are also several alternative approaches on historical prices. One is to assume that all statelands production historically has sold at market prices for Montana. A second approach is to assume that the farm program target prices are achieved on all state lands production, but no CRP payments. A final approach is to assume that CRP contracts were in place for at least the last five years and that target prices apply. The latter, along with the assumption of state yields at about 80% of historical all Montana yields is probably the most realistic. This particular set of assumptions yields an estimate of average cropshare received of 23.8%. The range across all assumptions is 21% to 28%. A more precise estimate from historical data would require considerable additional information on farm program payments and policy. A more precise estimate for FY 1993 will be possible when all revenues for that year are in as of June 30, 1993. FY 1993 revenues are the ones tied to the 1992 production we sampled.

Our conclusion is that the evidence suggests the "honor system" is working fairly well. Nonetheless, there does appear to be possibly some shortfall. It is possible that additional monitoring by the state would generate revenues in excess of what it would cost to administrate. One additional staff person costing something on the order of $20,000 annually might generate additional revenues on the order of hundreds of thousands of dollars. This individual could develop good computer records of revenues by crop type from state lands. This individual could also monitor any "anomolous" cropshare payments where the payment to the state fell significantly below the payment indicated by comparison of state or county average yields. This computer work could be complimented by field visits.

Table S-2. Estimates of cropshare actually received by Montana DSL on State Agricultural Leases.

	Crop Yield Assumptions	
Price Assumptions	MT average	Estimated State Lease[a]
1. Long Term Market (no CRP)	0.246	0.280
2. 1978-92 Target (no CRP)	0.225	0.256
3. 1988-92 Target w/ CRP	0.211	0.238

a. Based on ratio of reported production for 1992 to Montana state average production: (Wheat: DSL= 88.9% of MT average; Barley: DSL= 77.0% of MT average).

1.0 INTRODUCTION

1.1 Introduction

This is a report for the Montana Department of State Lands on the subject of fair market values for cropland leases. Cropland leases are Task 4 in a larger project, "Economic Analysis of the Values of Surface Uses of State Lands", which is being conducted by Bioeconomics, Inc. of Missoula, Montana. This study began in May 1992 will be completed in January 1993.

The basic approach to this problem is to collect information on current actual leases for all types of cropland in the State of Montana. The primary information needed is the market prices and terms for private market leases. The variation of market prices or crop shares with lease terms and services will be analyzed. Lease terms and services on state cropland leases will also be examined. A fair market price or crop share for state cropland leases will be determined based on market prices or crop shares for leases with comparable terms and services.

This analysis of cropland leases was conducted in two phases. The first phase included a pilot survey to identify the key determinants of cropland lease rates. This information was used to develop a survey instrument to be implemented on a sample of 1500 Montana farmers by the Montana Agricultural Statistics Service. This phase began on May 18 and was completed on September 27.

The second phase of the study is the implementation of the survey, analysis, and report writing. This phase began on September 28 (the first night of phone interviewing) and will be completed in early January 1993 with a final report. The following sections of this report describe in turn the study methods, data collection, results, and implications for policy toward cropland leases.

1.2 Background and Literature Review

Cropland rentals and the specific contractual approach of cropshares has received considerable attention in the economics literature. Many of the early economists such as Adam Smith, John Stuart Mill and Alfred Marshall examined issues concerning agricultural tenure including corpshares. However, most of this attention focused on whether cropshares or "share tenancy" was efficient compared to a cash rent (dollar/acre) contract. Cheung (1969) reviews much of this literature and offers a theory of share tenancy. A more recent literature review is provided by Otsuko and Hayami (1988). Cheung suggests that cropshare levels are a parameter that is set by market forces. In general cropshare levels are set so that the tenant's share is just sufficient to equal the wage rates in the tenant's next best alternative employment. This suggests that (other things equal) landlord cropshares will be higher on

more productive crops and lower when the tenant's alternative wage rate is higher. Cheung also suggests that cropshare contracts will be more common where their is higher risk (greater variance) in crop yeilds. For example, his data for China shows that cropsharing is much more common in wheat production (where yeilds fluctuate greatly from year to year) than in rice production.

Despite this considerable literature, empirical studies of cropshare on public lands are rather scarce compared to the large number of studies of grazing leases. On state lands, cropland leases are a relatively unimportant surface land use for most states. For example, Souder (1990) found that cropland comprised on average only 2 to 3 percent of the leased state trust lands by percentage use for ten western states. The only state in Souder's sample with cropland comprising over 10 percent of all uses by acreage was Montana (at 11.7%). Even in Montana, cropland is much less important than grazing uses. About 87% of Montana state trust land acreage is leased to grazing. In a recent survey of Western States trust lands, Souder and Fairfax (1991) did not even bother to compare the alternative methods for setting cropland fees on state lands - although these authors gave considerable attention to the issue of grazing fees.

The following discussion provides an overview of cropland leases in Montana and the alternative methods use to set cropland lease fees in the western states. This overview draws heavily on the survey of western state land commissioners undertaken as part of Task 2 in the larger project.

Montana leases approximately 560,000 acres for crop production. In 1992, the state received $8.7 million in revenues for the beneficiaries of the school trust. Revenues from crop leases have fluctuated from year to year, a result of variable yields and market prices for agricultural commodities. Montana crop leases are primarily for production of wheat, barley, and alfalfa hay. In 1992, the state averaged about $15.50 an acre for its cropland leases.

As noted, Montana has more state land in crop production than do most other western states. This mainly results from Montana retaining most of its original trust lands. Wyoming with 720,000 acres, Nebraska with 300,000 acres, Colorado with 240,000 acres, Washington with 170,000, and Arizona with 160,000 acres are the other western states with substantial amounts of land leased for crop production. Typically, western states sold most land with crop producing potential early in statehood.

States' management objectives for cropland leases are the same as for the grazing lands. States generally strive to maximize revenues for the school trust and other designated beneficiaries, while protecting the long-term well-being of the state land resource. More than is the case with grazing leases, states endeavor to achieve close to full market value for there cropland leases.

State leasing systems for cropland are either cash rents or crop shares (Table 1-1). Cash rent

is a fixed annual payment to the state usually based on a fee per acre. Crop share can either be a percentage of the crop produced or a percentage of the gross sales from a state parcel.

Most states use cash rent leasing systems. In a cash rent lease, the state receives a fixed payment irrespective of the crop production or market conditions. Another advantage of cash rent leases is that they are economical and uncomplicated for states to administer. In a crop share lease, the state and lessee share burden of the farming risk. Where yields and prices are favorable the state is likely to achieve higher income than it would receive from cash rents, but the state also experiences depressed earnings when yields or crop values are low.

Crop share lease systems are expensive and complicated for a state to administer effectively. A state should actually monitor lease specific crop production in order to insure that it receives its fair share. Hawaii hires auditors to monitor production from its crop share leases. This is justified and affordable because of the extremely high value of the crops grown in Hawaii. In dryland farming regions such as Montana, states tend to use the "honor system" to obtain their shares of crop production or gross sales (Jeff Hagener, personal communication, 1992) (Roy Henderson, personal communication, 1992). Because most leaseholders farm more than just a state parcel, it is difficult to segregate production from state lands a from a farmer's total production. Montana and Washington cite the inability to effectively monitor production on state parcels as a major shortcoming of crop sharing.

Where the state actually receives a percent of the crop produced, it must store and market the crop itself. This is an administrative disadvantage of receiving a physical share of the crop produced.

States which impose automatic renewal or preference right systems for grazing leases are likely to use a similar system for renewing cropland leases. Likewise, states using open bidding systems (without leaseholder preference rights) for grazing leases use open bidding for cropland leases. States with open bidding use auctions to award leases. The frequency of competitive bidding is greater for cropland leases than for grazing leases; however, the vast majority of cropland leases also are awarded non-competitively. An exception is Hawaii, which has competitive bidding on nearly all of its cropland leases.

Where bidding occurs, a state will always receive more income than if leases are awarded non-competitively. The bidding for cropland lease may be an annual cash rent payment, a one-time bonus payment, or a percent of crop production. In Montana, bidding is based on a percent of production (actually the value of crop production).

Table 1-1. Cropland Lease Characteristics.

State	Lease System*	Basis of Min. Rate*	Term* (Yrs)
Arizona	cash rent	mkt studies	10
California	cash rent	% est.crop val & comps	5-20
Colorado	cash rent	25% est.crop value	10
Hawaii	crop share	3-8% of crop value	
Idaho	cash rent	33-50% est crop value	10
Louisiana	crop share	20-25% crop value	5-10
Minnesota	cash rent	mkt studies	3-5
Montana	**crop share**	**25% of crop value**	**10**
Nebraska	cash rent	mkt studies	5-12
North Dakota	cash rent	mkt studies	4
Oklahoma	cash rent	mkt studies	5
Oregon	crop share	25% crop value*	10
South Dakota	cash rent	mkt studies	5
Texas	cash rent	mkt studies	5
Utah	cash rent	25% est of crop value*	15
Washington	crop share/1	25-33% crop value*	10
Wyoming	cash rent	4% appraised land val.	10

* where available table displays information for dryland leases. Some states have separate leasing systems for different crop types.

1/ Washington also has cash rent leases.

Determination of minimum lease fees is important because most cropland leases are awarded non-competitively. Minimum cash rents are typically based on studies of rental rates or the value of crop production for comparable private lands. In most cases, states rely on the agricultural statistics generated by the USDA to identify prevailing cash rents. The USDA publishes agricultural statistics by geographic sub-region. This allows states to institute variable cash rents based on local conditions. A few states use state department of agriculture studies to identify comparable rents and crop values.

Some states base their minimum cash rents on a percentage of the assumed value of production from the state parcel. This system differs from a crop share system in that the cash rent is a fixed amount, and is paid irrespective of actual production or crop prices. Cash rent is typically 25 percent of the estimated value of production from the state parcel. Estimates of crop yield and production values are most often also based on USDA or state department of agriculture statistics.

Cash rent in Wyoming is 4 percent of the appraised value of the agricultural land. Wyoming cash rents for dryland wheat range from $4.05 (15 bu./acre) to $10.75 (40 bu./acre) and averages $6.85 (25 bu./acre) (Jamie Van Hatten, personal communication, 1992). In Utah, annual cash rent for certain irrigated cropland is determined by multiplying the market value of land by the prime interest rate. Cash rents generally vary by land productivity and regional rental market characteristics. For example, cash rents for Oklahoma's dryland wheatland range from $7.50 to $19.00 an acre; or typically about a $1.00 a bushel for production years (John Taylor, personal communication, 1992). Nebraska receives $15.00 to $20.00 an acre for dry cropland. Idaho receives from $10.00 to $12.00 an acre for dry cropland.

Only one state, North Dakota, a charges a flat rate for all of its cropland. The state receives $15.00 acre for crop and $7.50 an acre for hay production. North Dakota intends to change its lease fee system (Mike Brand, personal communication, 1992).

Montana, Washington, Louisiana and Hawaii are states using a crop share system. Montana's crop share is normally 25 percent of the value of dryland wheat or barley production. It is common for leases for Montana's private lands to provide the property owner with 33 percent of the crop value. Washington's share of dryland wheat production ranges from 25 to 33 percent. Louisiana typically receives about 25 percent of crop values. The major crop grown on state lands in Hawaii is cut flowers. Hawaii typically receives 3 to 8 percent of the flower producers gross sales.

Basic cropland leases are typically from 5 to 10 years. Several states are willing to extend leases in instances where the lessee commits to make substantial capital improvements on the lands. For example, the installation mechanical irrigation system could be grounds for issuing a longer-term lease. Where orchards and vineyards are proposed for state parcels, Oregon, Washington, and California states may award leases for 20 to 40 years.

Where a state uses a crop share leasing system, the state is generally entitled to receive a share of the payment from the federal government. In Montana, the school trust receives 25-50 percent of CRP payments. The share of annual deficiency payments (difference of target and market prices) is the same as the cropshare. In most states, the share of CRP payments is also the same as the state's share of crop production. Texas cited difficulties in receiving its share of federal payments as the reason it switched from a crop share to a cash rent leasing system. States with cash rent systems receive their annual rents irrespective of whether the state land is in production and do not receive a share of CRP payments.

2.0 METHODS

2.1 Theory and Methods

Based on our review of the literature, we concluded that the information necessary to

determine fair market value on state lands in Montana was not currently available. Only by obtaining information on the lease terms (length of contract, services, cost sharing, productivity, etc.) for private market leases can one determine a fair market value for comparable public ground. Our goal was to design a survey that identified the relevant prices and lease terms. An intermediate goal was to define what were the specific factors and terms that were most important in determining lease prices. We chose to accomplish this goal by conducting a pilot survey.

In the following sections we describe in greater detail the specific methods used, including the pilot survey.

2.2 Hedonic Price Model

A primary objective of this study was to develop a model of how private market lease rates for cropland vary with lease terms and services. Such a model can then be used to predict a "fair market value" for a group of leases with similar lease terms and characteristics, such as leases on Montana state school trust lands.

The theoretical model adopted for this study is what is called a "hedonic price model" (Rosen, 1974). The central idea is that houses or land or similar goods can be modeled as single commodities differentiated by the amounts of various characteristics they contain. This model rests on a theory of product differentiation in pure competition. For example, one of the earliest hedonic price studies, by Ridker and Henning (1967) was an analysis of the relationship of housing prices to air pollution levels in St. Louis. The authors used a cross-section of observations on 167 census tracts where single family housing dominated. The relationship between housing prices and various characteristics was examined. Explanatory variables included an air pollution index, medium number of rooms in the homes, houses per square mile (proxy for lot size), proximity to shopping and the central business district, school quality and crime rates. By controlling for the factors that affect price in a statistical model, one can identify the relationship of price and specific individual characteristics of interest, such as air pollution.

The hedonic price schedule reflects an equilibrium from the interaction of consumers, who benefit from the characteristics, and producers or sellers of the commodities, who incur costs. The costs are dependent on the variety and amount of characteristics provided in these differentiated products. In the Rosen (1974) model, the differentiated product is represented by a vector Z ($Z = z_1, z_2,\ldots,z_n$) where the product characteristics are z_i. The marginal price of a given characteristic is the partial derivative of the total price P with respect to that characteristic, or $\delta P/\delta z_i$. The model estimated is simply P as a function of Z; for example in a linear specification:

$$P=\alpha+\beta_1 z_1+\ldots+\beta_n z_n \qquad (1)$$

For the application at hand, we view cropland leases as contracts for a differentiated product. The product is the services of the land resource as an input in the production of agricultural commodities. On an a priori basis, we would expect the key characteristics of the "land input" to include the type and extent of services included in the lease price (such as fence maintenance and water improvements), the productivity of the lease (crop yields), the type of crop and the term of the lease (number of years the contract is for). In order to obtain some insight into the key characteristics, we conducted a pilot survey (as described in a following section). The pilot survey was undertaken to ensure that we designed a final survey instrument (Appendix E) that asked respondents about the primary characteristics of interest.

The only other formal economic model utilized in this study was a contingent valuation model. Contingent valuation is a survey approach in which respondents are asked their willingness to pay for a given service or commodity (Ward and Duffield 1992). A possibly important change in the characteristics of cropland leases on state lands is that as of March 1 of this year, holders of a State Lands recreational use permit can have access to these leases for fishing and hunting. We wanted to investigate how this change was valued from the standpoint of leaseholders. One would expect that recreational access could impose costs on current leaseholders. One approach to valuing this change is to ask leaseholders their willingness to pay to control access rights. The specific contingent valuation method used was dichotomous choice. In this question format, respondents are faced with a fixed bid amount and reply "yes" or "no" as to whether they would be willing to pay that amount for the resource or right in question. (See Appendix E, question 19 in Section C for the wording of this question.)

We will briefly describe the theoretical motivation for dichotomous choice models. Hanneman (1984) provides both a utility difference approach and an alternative derivation based on the relationship of the individual's unobserved true valuation compared to the offered threshold sum (see also Cameron 1988). In the latter, it is assumed that if each individual has a true willingness-to-pay (WTP), then the individual will respond positively to a given bid only if his WTP is greater than the bid. For example, suppose that an individual is confronted with an offered price (t) for access to a given resource or recreational site. The probability of accepting this offer $\pi(t)$, given the individual's true (unobserved) valuation WTP is then:

$$\pi(t) = Pr(WTP > t) = 1 - F(t) \qquad (2)$$

where F is a cumulative distribution function of the WTP values in the population. In the logit model F(.) is the c.d.f. of a logistic variate and in the probit model F(.) is the c.d.f. of a normal variate. The specification of this model can be briefly illustrated for the case where

the WTP values are assumed to have a logistic distribution in the population of interest conditional on the value of covariates. A statistical model is developed that relates the probability of a "yes" response to explanatory variables such as the bid amount, preferences, income, and other standard demand shifter type variables. The specific model is:

$$\pi(t;\tilde{x}) = [1 + \exp(-\alpha t - \tilde{\gamma}'\tilde{x})]^{-1} \quad (3)$$

where $\pi(t;\tilde{x})$ is the probability that an individual with covariate vector $\tilde{x}$ is willing to pay the bid amount t. The parameters to be estimated are α and $\tilde{\gamma}'$ (the constant term is included in $\tilde{x}$). The equation to be estimated can be derived as:

$$L = \ln[p/(1-p)] = \alpha t + \tilde{\gamma}'\tilde{x} \quad (4)$$

where L is the "logit" or log of the odds of a "yes" and p are observed response proportions. In application, the logit and probit models are so similar that it is difficult to justify one over the other on the basis of goodness of fit. We choose to work with the logistic specification here because the probit model does not lead to closed-form derivatives. Maximum likelihood estimates of the parameters in equation 4 can be obtained with a conventional logistic regression program. We have utilized SAS (SAS Institute 1988). Welfare measures include the mean, median or other percentiles of the estimated WTP distribution. Welfare measures and approaches for estimating the variance of these parameters are described in Duffield and Patterson (1991).

2.3 Pilot Survey

A number of activities were necessary in the first phase of this study in order to achieve our first objective: development of a final survey instrument for a detailed phone survey of 1500 Montana farmers. Secondarily, it was necessary to develop an agreement with the Montana Agricultural Statistics Service (hereafter "MASS") to implement this survey. The basic results of this work are provided in a set of documents appended to this report. Appendix E provides the final phone survey implemented by MASS and Appendix D is a mailing and "warmup" letter sent to all survey participants prior to telephone contact. Appendix A is a signed Memorandum of Understanding (MOU) between MASS and the Department of State Lands on how the survey will be implemented. Appendices B and C provide copies of the pilot survey and a brief summary of results. The following narrative describes these activities and results in greater detail.

In order to identify the most important factors determining private cropland lease rates, we developed a study team that included experts in the area of agricultural economics and rural sociology. The team included Dr. Alan Bjergo, an agricultural economist with the Montana State University Extension Service and Dr. Patrick C. Jobes, a Professor of Sociology at Montana State University. A pilot survey instrument was developed (Appendix B).

For purposes of this survey, we chose to target a relatively small sample of about 30 individuals. The sample was chosen based on previous knowledge of the ranching community, but was stratified by region. The surveys were personally administered by Patrick Jobes in July 1992. The purpose was not to develop an extensive data base for statistical analysis, but rather to gather general information on the market for leases that could be used in developing a survey instrument for the Phase II survey. A report describing the highlights (authored by Patrick Jobes) is in Appendix C. We did choose to code the answers and develop a small data base. Frequency distributions for all questions and a coding sheet are provided in the preliminary report for this task.

2.4 Phone Survey Design and Methods

Based on the result of the pilot survey, we developed a draft Phase II phone instrument. Throughout August there were extensive revisions to the initial draft. In late August MASS began participating in the survey design and development of a computer assisted telephone instrument (CATI) that was programmed in BLAISE software. The lead responsibility for this work was with Steve Susemihl of MASS, with participation by Jim Sands and Curt Lund. A hardcopy of the final survey is provided in Appendix E.

The final phone survey instrument is organized into six sections. The intitial section (A) obtains information on land tenure (acres operated by category). Section B is general questions for tenants and provides operation or farm-level information on type of operation, and number and type of leases. Sections C and E, which are up to 25 questions long, are the heart of the survey. In these sections (which address tenants and landlords, respectively), detailed questions are asked concerning the lease rates, terms, services and productivity of the specific leases (see Appendix E for details). The phone survey was designed so that this section was repeated, depending on the number and type of leases held. No respondent was asked to complete more than four lease arrangements. The priority for selection was: two largest private leases as a tenant; two largest public leases with the largest state lease selected first followed by the largest non-state; two largest landlord leases. Of course for the many respondents with no leases of any type, Sections C through E are skipped entirely.

Section F includes general questions on leasing for all respondents. The first question is on the "reported" average charge for leasing in the respondents area. The remaining questions elicit attitudes toward public leases, state lease fees and competitive bidding (see Appendix E).

The desired initial contact sample for this survey was set at 1500. Based on previous surveys it was anticipated that only about half of the MASS cropland list would actually hold private leases. Given nonresponse and the nonleaseholder share this would probably have yielded about 600 lease holder respondents. A sample of 600 leaseholders was thought to be adequate to stratify the responses by subsamples across lease type, region, and major lease characteristics. The sample was drawn systematically from a list with all farmers ranked by size of the operation.

2.5 Cooperative Agreement with Montana Agricultural Statistics

Parallel to the development of the survey instrument, it was necessary to develop an agreement with MASS to implement the survey. MASS was selected for this work because of their experience, high professional standards, credibility and capability of implementing a phone survey. Only through the use of CATI methods (where the data base is automatically constructed through the course of the surveys) can the tight time frame for this study be met. We met with MASS and State Lands personnel on May 22 to initiate the development of a formal MOU. This was finalized on August 26 (Appendix A.)

3.0 DATA COLLECTION

3.1 Survey Administration

The phone survey was administered by MASS, with all of the interviewing done out of their Helena office. Because of the scale of this survey, it was necessary to involve approximately 30 enumerators.

An important design consideration was the decision to use a pre-survey mail contact to increase the response rate and provide respondents an opportunity to prepare for the survey by assembling records as necessary. This mailing was sent out on September 22. The survey design effort culminated in a training session for 30 phone enumerators in Helena on September 24, and the survey began on September 28. The phone survey ended in early November and Bioeconomics was provided with an electronic data base on November 10.

3.2 Response Rates

The total sample for this survey was 1,500 Montana farmers (Table 3-1). The cooperation rate was 83.5% and the completion rate was 71.6% (see Table 3-1 for definitions). These response rates are high for a phone survey and indicate high quality survey administration and practices. We were concerned that many individuals might refuse to participate in a survey which provided confidential information on an emotional issue like lease rates on state school trust lands. However, the refusal rate was only 14 percent. We greatly appreciated the courtesy and patience of the many individuals who participated in the survey. MASS procedures ensured the complete confidentiality of responses; there is no way for us to associate an individual or an operation name with the survey responses.

Table 3-1. Cropland Lease Survey Completion Rate Statistics.

Category	Number	Percent
Potential Respondents		
Completed Interviews	1024	68.3
Refusals	205	13.7
Unable to Reach	201	13.4
Subtotal	1430	95.3
Disconnected Telephone	70	4.7
Total Sample	1500	100.0
Cooperation Rate[1]		83.5
Completion Rate[2]		71.6

1. Equals completed interviews/(completes+refusals).
2. Equals completed interviews/potential respondents.

4.0 RESULTS

4.1 Overview of Land Tenure and Lease Characteristics

In this and the following sections we summarize the main survey results. A comprehensive variable list is provided in Appendix H. Detailed statistics on many variables are provided in Appendix I, forthcoming.

In this section we provide an overview of land tenure and lease characteristics based on the farming operation.

Summary statistics for farm acreages are shown in Table 4-1. Table 4-2 shows acreage figures only for those having acreages > 0. Table 4-3 shows lease numbers and averages by lease type for the sample. The average number of total acres was 4961; the median was substantially lower at 2050 acres. Ownership amounted to 2757 acres on average, half of the farmers owned less than 1120 acres, and 7% of the those in the sample owned no land whatsoever. Leased land averaged 878 acres per rancher, although 43.5% had no leased land in the operation. Among those leasing land the average lease was 1553 acres (Table 4-2), and the median was a section (640 acres). The average acreage rented to others was 69 acres

overall, and 624 acres for the group renting land to others (11.1%). Cropland acres averaged 1045 acres per farmer. CRP (Conservation Reserve Program) acreage amounted to 159 acres per farmer, although 73% reported having no acreage in CRP. The average number of acres in CRP, among those participating in the program, was 589.

Table 4-1. Land Tenure Characteristics of Farms.

Variable	Min	Max	Mean	Median	Std Dev	N	% with 0 acres
Owned	0	120000	2756.9	1120	6181.8	955	7.2
Rented From Non AUM	0	50000	877.8	150	2506.2	959	43.5
Rented To	0	3400	68.9	0	289.4	959	88.9
Rented From AUM acres	0	190000	1422.8	0	8155.3	933	64.3
Total Acres	1	238000	4960.6	2050	12187.8	955	0.0
Land in Farm	1	123000	3570.6	1720	6939.8	955	0.0
Cropland Acres	0	12000	1044.9	606	1250.5	953	4.9
CRP Acres[1]	0	3450	159.4	0	366.1	953	72.9

1. Conservation Reserve Program acres.

Table 4-2. Land Tenure Characteristics of Farms, for Acreages > 0.

Variable	Min	Max	Mean	Median	Std Dev	N
Owned	1	120000	2971.6	1260	6368.4	886
Rented From Non AUM	5	50000	1553.2	640	3173.6	542
Rented To	5	3400	623.6	368	644.3	106
Rented From AUM acres	8	190000	3986.3	1080	13283.7	333
Total Acres	1	238000	4960.6	2050	12187.8	955
Land in Farm	1	123000	3570.6	1715	6939.8	955
Cropland Acres	11	12000	1099.1	700	1259.1	906
CRP Acres[1]	6	3450	588.8	482	492.6	258

1. Conservation Reserve Program acres.

Table 4-3. Size and number of leases held by lease type.

Lease type	Total number	Mean	Median	Std Dev
Private	471	569.56	320	761.7
State	116	265.6	183	246.2
BIA	34	593.8	160	1501.4
Other	3	122.7	106	90.2
Landlord	14	490.4	390	546.2
Total	639	511.2	300	758.8

The five categories of lease types are listed in Table 4-4; these included private, state, BIA, other, and landlord. Landlord leases are simply private leases where the respondent was the landlord rather than the tenant. Private leases were the most frequently held type of lease.

For those holding leases, 73% held at least one private lease, and 31% held multiple private leases. Multiple leasing was rare for state leases; single leases were held by 20%, and multiple state leases were held by only 3% of the farmers. BIA leases were infrequent (6%), and generally single leases.

Table 4-4. Number of leases held by lease type, expressed as % farmers.

Number	Private	State	BIA	Other
0	26.6	76.9	94.5	99.3
1	42.6	20.2	3.1	0.4
2	15.4	0.9	0.4	0.2
3	8.1	1.1	0.2	0.0
4	3.3	0.4	0.4	0.0
5	1.8	0.2	0.2	0.0
6	0.9	0.0	0.2	0.0
7	1.1	0.0	0.2	0.0
8	0.2	0.0	0.2	0.0
9	0.0	0.2	0.4	0.0

The majority of crop leases were used for wheat production and were located in district 20 or 30 (Northcentral and Northeast Montana. See Appendix G for district code definitions, Figure 4-1 for map), and grew barley as a second crop (Tables 4-5, 4-6).

Nearly all leases (97.3%) had one or more crops. Half of all leases diversified with a second crop, and one third had a third crop (Table 4-5).

The primary crops grown for the leases in our sample were spring wheat on summer fallow (30%) and winter wheat on summer fallow (26%). Alfalfa hay was the primary crop for 5% of all leases (Table 4-5). Other crops, each less than 5% of the leases, made up the remaining 39% of the primary crops on the leases. The secondary crop was most frequently barley grain (23%), especially barley grain on summer fallow (13%). A third of all leases had a third crop, again, generally a barley grain crop (15%).

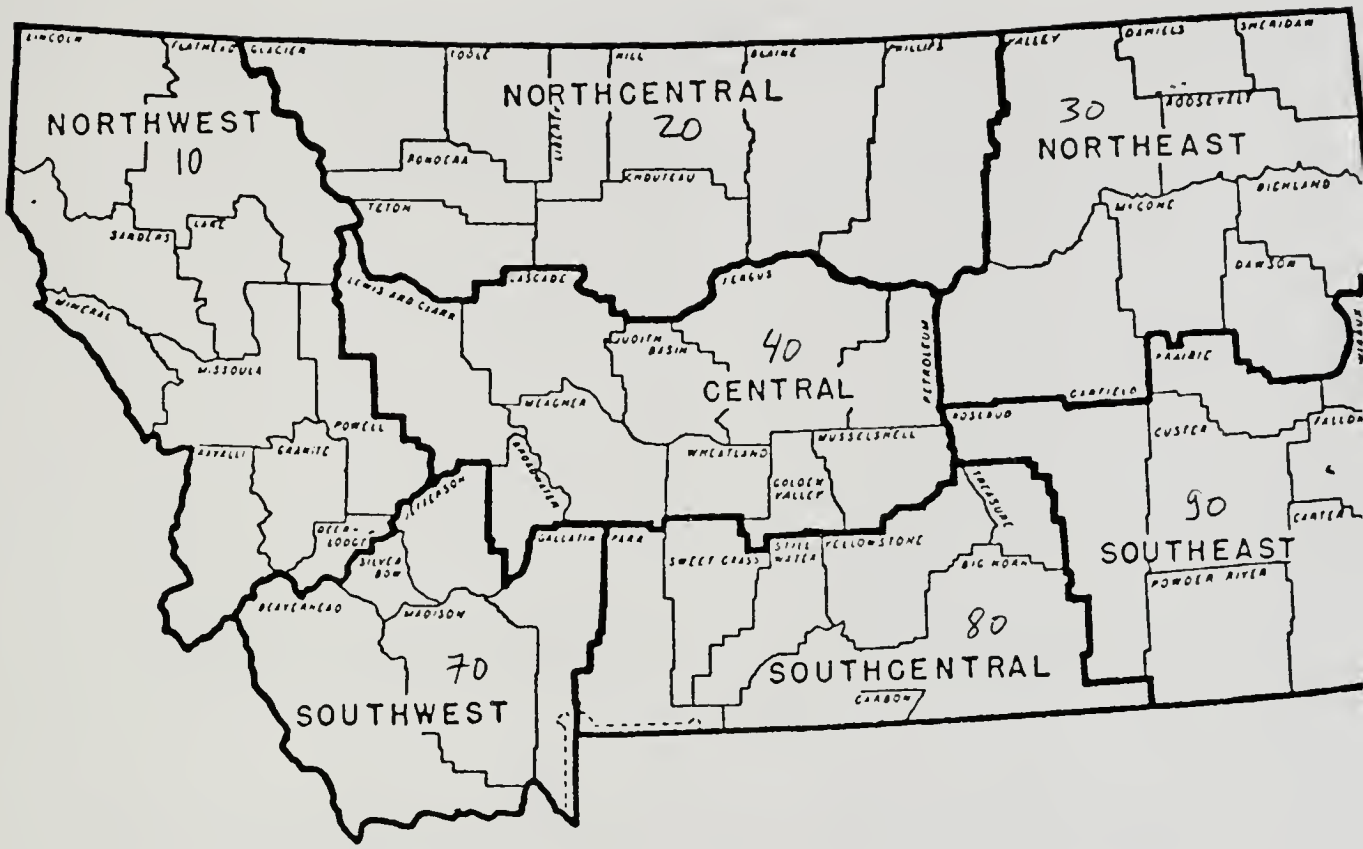

Figure 4-1. Montana Counties and Districts.

Table 4-5. Main crop types (>2%) grown on leases.

Crop Type	1st crop	2nd crop	3rd crop	4th crop
Winter Wheat/Recropped	2.8	1.1	0.0	2.8
Winter Wheat/Fallow	26.1	3.0	0.6	1.8
Spring Wheat/Irrigated	3.6	2.8	1.9	1.8
Spring Wheat/Recropped	4.5	1.7	0.9	0.9
Spring Wheat/Fallow	29.6	7.0	1.2	0.0
Barley Grain/Irrigated	4.4	3.3	3.1	1.8
Barley Grain/Recropped	1.7	6.3	5.9	2.8
Barley Grain/Fallow	2.0	13.0	6.2	2.8
Alfalfa Hay/Irrigated	5.2	2.5	3.7	2.8
Alfalfa Hay/Non-Irrigated	1.7	0.5	2.5	2.8
Sugar Beets/Irrigated	2.8	0.9	0.9	0.9
Conservation Reserve	3.9	0.0	0.0	0.0

Almost 70% of all leases had some type of wheat as a primary crop. 16% had wheat as a secondary crop, and 24% had barley as a secondary crop (Table 4-6).

Table 4-6. First and second crop types grown on leases.

Crop Type	1st crop	2nd crop
All Wheat	68.9	16.4
All Barley	8.3	23.9
All Oats	0.3	1.9
All Corn	1.7	1.7
All Hay	9.9	3.8
All Sugar Beets	2.8	0.9
Other Crops	5.5	0.8
No crops	2.7	49.9

4.2 Lease Rates

The distribution of leasing rates for private leases by district is shown in Table 4-7. Notably, cash per acre leases were most common in District 10. Districts 20 and 30 had the highest frequency of cropshare leases.

Table 4-7. Distribution of charge basis by district, in percent (%).

Charge Basis	Dist 10	Dist 20	Dist 30	Dist 50	Dist 70	Dist 80	Dist 90
Cash /acre	78.6	30.4	31.8	41.9	60.0	46.7	40.0
Share	14.3	66.5	67.4	54.8	40.0	53.3	52.0
Other	7.1	3.1	0.8	3.2	0.0	0.0	8.0

Private lease rates on a cash/acre basis ranged from $2.10 to $200.00/ac., and averaged $37.68/ac. (Table 4-8). For all leases pooled cash per acre rates averaged $34.00. Eleven state cropland leases were reported to be billed on a per acre basis; they are likely to be erroneous, but are included for completeness. BIA leases were less expensive than private leases, ranging from $2.00/ac. to $60.00/ac, and averaging $15.09/ac.

Table 4-8. Fees on Per Acre Basis by Lease Type.

Lease Type	Average	High	Low	Std Dev.	Sample (n)
Private	37.68	200.00	2.10	36.96	146
State	22.23	50.00	1.09	17.05	11
BIA	15.09	60.00	2.00	9.26	33
Other	33.00	33.00	33.00	-	1
Landlord	60.94	200.00	15.00	71.86	8
All Leases pooled	34.00	200.00	1.09	36.30	199

Cash/acre private lease rates by district are shown in Table 4-9. Least expensive was district 50 at $24.04/ac., and most expensive was district 70, at $72.95/ac.

Table 4-9. $Cash/acre rates by district, private leases.

Lease Type	Average	High	Low	Std Dev.	Sample (n)
District 10	37.29	75.00	7.5	14.13	19
District 20	31.96	75.00	5.00	21.88	34
District 30	24.26	200.00	6.40	32.13	35
District 50	24.04	100.00	2.10	27.49	19
District 70	72.95	200.00	11.50	64.14	10
District 80	58.99	200.00	2.50	47.98	20
District 90	54.56	100.00	7.00	34.32	9
All Leases pooled	37.68	200.00	2.10	36.96	146

Share crop rates for all leases pooled ranged from a low of 26.4% with the state, to a high

of 36% with landlord leases (Table 4-10). Private leases reported by tenants in our sample averaged 33%.

Table 4-10. Crop share Basis by Lease Type.

Lease Type	Average	High	Low	Std Dev.	Sample (n)
Private	33.1	75.0	5.0	11.00	260
State	26.4	75.0	10.00	12.69	94
BIA	--	--	--	--	--
Other	29.0	33.0	25.0	5.66	2
Landlord	36.0	40.0	33.0	3.61	3
All Leases pooled	31.3	75.0	0.25	11.74	360

The frequency distribution of cropshare rates for private leases is shown in Table 4-11 and Figure 4-2. This distribution was basically bimodal, with 25 and 33% being the most common cropshare rates. Cropshares of 50% were also frequently reported.

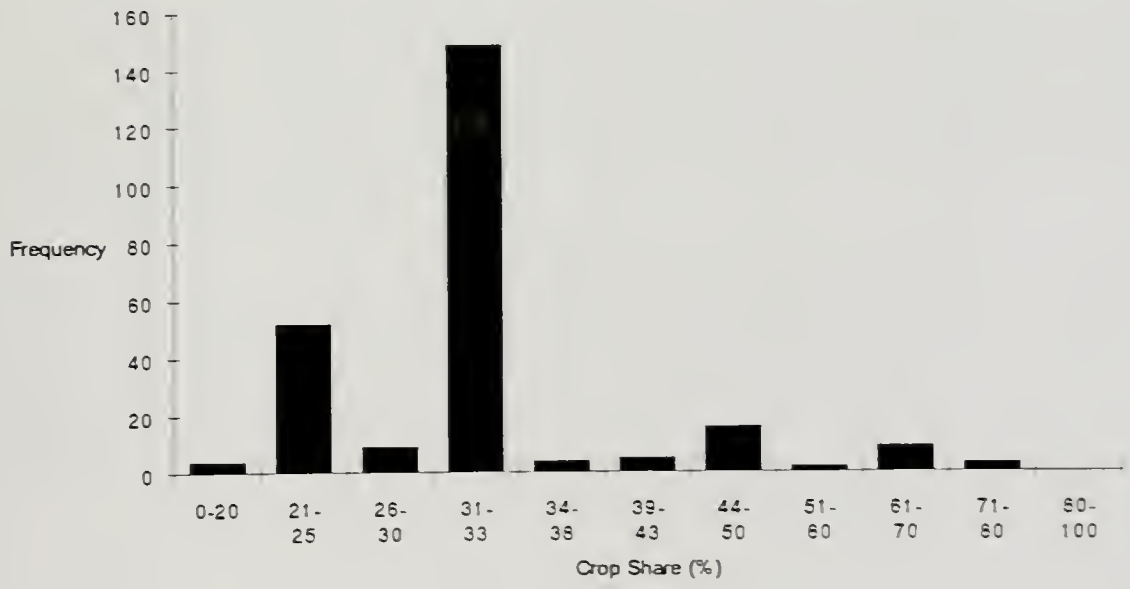

Figure 4-2. Reported Private Crop Share Rates.

Table 4-11. Frequency Distribution of Crop Shares on Private Market Leases in Montana, 1992, All Crops.

Crop Share (%)	Frequency	Percent
5	1	0.4
20	3	1.2
23	1	0.4
25	51	19.6
28	1	0.4
30	8	3.1
31	1	0.4
33	148	57.0
34	1	0.4
35	3	1.2
40	5	1.9
50	16	6.2
55	2	0.8
60	4	1.5
66	5	1.9
75	3	1.2

* outliers <3.33 removed.

Average crop share rates by district for private leases (Table 4-12) ranged from an average high of 39.7% in district 90 (n=4), to an average low of 31.0% in district 80.

Table 4-12. Crop share rates by district, private leases.

Lease Type	Average	High	Low	Std Dev.	Sample (n)
District 10	39.0	50.0	33.0	8.04	4
District 20	32.3	66.0	25.0	7.14	96
District 30	35.1	75.0	20.0	10.83	81
District 50	34.0	60.0	5.0	9.70	31
District 70	38.4	50.0	33.0	7.56	8
District 80	31.0	50.0	20.0	6.30	21
District 90	39.7	75.0	25.0	19.99	12
All Leases pooled	33.9	75.00	5.0	9.76	253

4.3 Lease Services and Productivity

In this section we compare services and productivity across lease types. In general, private leases consistently provided the most in terms of services. The state provided the least of any in terms of services. For most private cropland leases (>70-80%), the landlord provided no irrigation, building and machine storage, or other services like fencing. On state leases, no service costs were paid in 97-98% of the leases. Differences in services are not as pronounced as for grazing leases.

Landlords of private leases contributed to irrigation costs in 13.6% of the cases, and paid all of the costs in 3.4% of their leases (Table 4-13). The state contributed the least towards irrigation costs, paying nothing with the exception of two leases where all costs were reported to be paid. The lessor most frequently contributing to irrigation costs was the landlord (private) group, sharing some part of irrigation costs in 28.5 % of the leases.

Table 4-13. Irrigation services participation of landlord.

Lease	Nothing	Materials	Labor	Material / labor	All costs	Other
Private	86.4	7.0	0.0	1.1	3.4	2.1
State	98.2	0.0	0.0	0.0	1.8	0.0
BIA	94.1	2.9	0.0	0.0	2.9	0.0
Other (n=3)	100.0	0.0	0.0	0.0	0.0	0.0
Landlord	71.5	21.4	0.0	0.0	0.0	7.1
Overall	88.6	8.7	0.0	0.8	3.0	1.7

Lessor participation in building and machinery storage costs was greatest for private leases, and least for public leases (Table 4-14). Private lessors made some contribution to these costs in 18.4% of their leases, as opposed to 2.6% and 3% for the state and BIA, respectively.

Table 4-14. Building and machinery storage cost participation of landlord.

Lease	Nothing	Materials	Labor	Material / labor	All costs	Other
Private	81.7	10.0	0.0	1.1	5.3	1.9
State	97.4	0.9	0.0	0.0	1.8	0.0
BIA	97.1	0.0	0.0	0.0	2.9	0.0
Other (n=6)	100.0	0.0	0.0	0.0	0.0	0.0
Landlord	78.6	14.3	0.0	7.1	0.0	0.0
Overall	85.3	8.6	0.0	1.0	4.4	1.4

Lessor participation in grain storage costs was greatest for private leases, and least for public leases (Table 4-15). Private lessors made some contribution to these costs in 27.3% of their leases, as opposed to 2.6% and 3% for the state and BIA, respectively.

Table 4-15. Grain storage cost participation of landlord.

Lease	Nothing	Materials	Labor	Material / labor	All costs	Other
Private	72.7	15.8	0.0	1.1	8.5	1.9
State	97.4	0.0	0.0	0.5	0.0	0.0
BIA	97.1	0.0	0.0	0.0	2.9	0.0
Other (n=6)	100.0	0.0	0.0	0.0	0.0	0.0
Landlord	64.3	21.4	0.0	7.1	7.1	0.0
Overall	78.4	12.2	0.0	1.0	7.1	1.4

The remaining services, such as weed control, pest control, fertilizer costs, fencing costs, etc. all followed a similar pattern, with private lessors making a contribution of some kind in 10-20% of the leases, and public agencies contributing very little or nothing.

Overall, noxious weeds were reported to be a problem on 24% of all cropland leases in the study (Table 4-16). State and private leases have similar rates (23% and 21%, respectively), both being close to the average of all leases. BIA leases appeared a bit higher, at 32%. Differences were not statistically significant (ANOVA, $\alpha=0.05$).

Table 4-16. Noxious weed problem on leases.

Lease	Weed Problem	
	Yes	No
Private	23.2	76.8
State	21.2	78.8
BIA	32.3	67.7
Other	66.7	33.3
Landlord	28.6	71.4
Overall	23.7	76.3

Farmers rating productivity of their leases consistently ranked private leases over public leases (Table 4-17). Eighteen percent (18%) of private leases were ranked excellent, against 5% of the state leases. Landlords tended to rank their private, leased out land highest of all (excellent in 28.6% of the cases). State lands led the poor ranking at 10.8%.

Table 4-17. Productivity rating of leases.

Lease	Excellent	Good	Fair	Poor
Private	17.6	53.1	25.1	4.3
State	5.4	45.9	37.8	10.8
BIA	0.0	67.7	29.4	2.9
Other	0.0	100.0	0.0	0.0
Landlord	28.6	35.7	28.6	7.1
Overall	14.6	52.5	27.5	5.4

Drought performance

Farmers ranking the drought performance of their leases ranked private lease best, with 31% ranked either good or excellent (Table 4-18). Landlords ranking their leased out land ranked it highest, with more than half in the good category. Public land was considered good in only 17-18% of the cases. BIA was ranked slightly lower than state.

Table 4-18. Drought performance of leases.

Lease	Excellent	Good	Fair	Poor
Private	5.2	25.4	30.5	38.9
State	0.0	18.2	34.6	47.3
BIA	0.0	17.7	26.5	55.9
Other	0.0	0.0	33.3	66.8
Landlord	0.0	57.4	21.4	21.4
Overall	3.8	24.3	30.8	41.1

Factors affecting lease marketability.

Farmers reported that state leases had some aspect limiting marketability (i.e. reducing the economic value of the land to prospective users) in 22% of the cases (Table 4-19). This was significantly higher than private leases, at 6.4%. Factors cited as limiting were generally poor access, or mediocre land quality.

Table 4-19. Limited marketability of leases.

Lease	Yes	No
Private	6.4	93.6
State	22.0	78.0
BIA	10.7	89.3
Other	0.0	100.0
Landlord	0.0	100.0
Overall	9.2	90.8

Inholding Status

State leases were surrounded inholdings in 27.4% of the cases (Table 4-20). This was only marginally higher than the global average of 23.6%, and the private average of 23.7%. BIA leases were less often surrounded inholdings (17.7%).

Table 4-20. Inholding status by lease type.

Lease Type	No	Yes	% Fenced
Private	76.3	23.7	47.8
State	72.6	27.4	38.7
BIA	82.3	17.7	33.3
Other	100.0	0.0	NA
Landlord	85.7	14.3	50.0
All Leases pooled	76.4	23.6	45.3

4.4 Hedonic Price Modeling

Following the theory and methods described previously, a hedonic price models were estimated to explain private lease $/acre and cropshare rates as a function of the measures of

lease terms, services and productivity described in the preceding section.

A 2/3 sample fraction was randomly selected from the private leases and used to develop the price models. Models developed from this fraction were then tested against the remaining 1/3 fraction as a measure of robustness and predictive ability.

The charge basis (dependent variable) is of course stratified into 2 separate groups: $/acre basis, and cropshare basis. Leases with wheat as the primary crop were selected to develop the $/acre model. This approach was chosen for two main reasons. Firstly, the great majority of leases were wheat farming operations, especially winter or spring wheat on summer fallow. Secondly, selecting only wheat minimized variability in land rents associated with vastly different crops like potatoes or sugar beets.

The cropshare model was developed using all private leases and all crops since cropshare percentages were expected to be independent of crop type. Eight outliers were excluded from the crop share analysis; these were reported shares ranging from 0.25% to 3.33% and were almost certainly enumerator entry error. Additionally, a small number of individuals reported paying shares greater then 50% (see table 4-11); these observations were not included in the modeling because in districts with limited observations they tended to unduly bias the prediction upwards.

The full model and reduced models for private $/acre wheat and cropshare lease rates are shown in Tables 4-21 and 4-22. The full model for $/acre land rents of wheat farming leases included district variables to account for regional differences, service variables reflecting landowner participation in irrigation and building costs, a dummy variable for irrigated wheat, and yield, in bushels/ac. (see variable definitions, Table 4-23).

The $/acre reduced model explained land rent in terms of whether the wheat crop was irrigated or not, and a services variable (building and machinery storage costs). Yield did not help explain differences in lease rates once the dummy variable for irrigated wheat entered the model. District did not prove useful as a predictor of land rents for the wheat farming leases. Among service variables, building and machinery storage happens to provide the best fit for the data, although other service variables like fencing or grain storage costs can substitute. Building and machinery costs might be best interpreted as a proxy for landlord services. The reduced model explained 36% of the variability in lease rates.

The $/acre land rent model predicts a base price for wheat of $18.38/ac., plus $21.90/ac for irrigated wheat, plus an additional $8.35 for services, i.e., landowner participation in building or machinery storage costs. State leases for wheat farming, being primarily dryland and without services, would be valued at $18.38/ac. on average according to this model.

Table 4-21. Full and reduced hedonic $/acre wheat model.

Variable	Complete Model	Reduced Model
Intercept	11.27	18.38
(t-stat)	(1.46)	(11.96)
District 10	8.77	--
	(1.43)	
District 20	6.23	--
	(0.99)	
District 30	2.66	--
	(0.45)	
District 50	2.27	--
	(0.375)	
District 70	4.21	--
	(0.276)	
District 90	20.40	--
	(1.33)	
Yield (bu/ac)	0.071	--
	0.592	
Irrigated Wheat	19.74	21.90
	(4.439)	(5.09)
Building Costs	10.11	8.35
	(2.49)	(2.07)
Irrigation Costs	-3.81	--
	(-0.37)	
Adj r^2	0.47	0.36
Sample (n)	50	53

The reduced cropshare model (Table 4-22) explained percent cropshare in terms of location (Districts 10, 20, 30, 70). District dummy variables explained only 10% of the variability in cropshare. The cropshare model estimates a base rate of around 30%, with an additional 12% in district 70, 11% in district 10, 4% in district 30, and 2% in district 20.

The model suggests that cropshare rates are independent of other factors like services or productivity. The cropshare model was re-estimated a number of times on different random 2/3 splits of the data to assess stability of the coefficients. The crop share model (Table 4-22) was found to be particularly unstable. Service variables for irrigation services, grain storage, and machinery costs can substitute for district dummy variables, but did not add to the predictive power of the model. The models were also found to be particularly sensitive to extreme values, especially if observations were limited in a given district. For example, excluding certain outliers changed which variables were statistically significant.

Table 4-22. Full and reduced hedonic share/all crops model.

Variable	Complete Model	Reduced Model
Intercept	28.22	29.73
(t-stat)	(12.16)	(28.12)
District 10	10.89	11.27
	(2.42)	(2.82)
District 20	3.74	2.24
	(1.54)	(1.68)
District 30	4.21	3.77
	(1.69)	(2.66)
District 50	0.62	--
	(0.23)	
District 70	10.40	11.87
	(2.60)	(3.75)
District 90	1.89	--
	(0.54)	
Irrigated Wheat	1.71	--
	(0.52)	
Building Costs	0.48	--
	(0.33)	
Irrigation Costs	1.75	--
	(1.83)	
Adj r^2	0.08	0.10
Sample (n)	164	164

Table 4-23. Variable definitions for hedonic price models.

DISTRICT 10-80= dummy variable 0/1, coded 1 if lease is located in a given district , 0 otherwise. See Appendix G for complete listing of counties/ districts.

IRRIGATION COSTS= Landowner participation in irrigation costs. Dummy variable coded 1 if contribution 2,3,4,or 5, and 0 otherwise.

1) Nothing
2) Materials only
3) Labor only
4) Materials and some labor
5) All of the costs.

IRRIGATED WHEAT= Dummy variable for irrigated wheat , coded 1 if wheat is irrigated, and 0 otherwise.

BUILDING COSTS= Landowner participation in building costs. Dummy variable coded 1 if contribution 2,3,4,or 5, and 0 otherwise.

1) Nothing
2) Materials only
3) Labor only
4) Materials and some labor
5) All of the costs.

4.5 Predicted Fair Market Prices

The cropshare model estimates cropshare as a function of district. Predicted cropshare rates would be independent of lease type, thus, the model predicts equivalent shares for private and public leases. No service variables were significant predictors of cropshare rate. Therefore, the implied base rate for state leases would be 30%, plus additions depending on district. These results should interpreted with caution, as the model has low explanatory power, and was quite sensitive to subsample and outlier selection.

The $/acre land rent model predicts a base price for wheat of $18.38/acre., plus $21.90/acre for irrigated wheat, plus an additional $8.35 for services, i.e., landowner participation in building or machinery storage costs. State leases for wheat farming, being primarily dryland and without services, would be valued at $18.38/acre on average according to this model.

4.6 Competitive Bids on State Leases

The majority (56%) of farmers holding state leases reported that a competing bid had not been submitted on their lease, while 26% said a bid had been submitted (Table 4-24).

Table 4-24. Competing Bid for state leases.

Bid	Percent (%)
Yes	25.9
No	56.0
Don't know or Missing	18.1

The prevalent reason given for why no competing bid had been submitted was neighbor relations (43%), followed by other, and inholding status (Table 4-25).

Table 4-25. Reasons why no bid submitted.

Reason	Percent (%)
Inholding Status	18.5
Cost of Enclosure	4.6
Neighbor Relations	43.1
Other	26.2
Don't Know	7.7

In response to the hypothetical question "Suppose that there was a state lands cropland lease in your area that could work well in your farming operation, but the lease is currently held by a neighbor. At the time of lease renewal, would you submit a competitive bid ?", the majority (53.1%) of all farmers surveyed they would not submit a bid out of consideration for a neighbor, 16% said they might submit a bid, and only 18.1% said they would submit a bid.

Table 4-26. Would you submit a competing bid ?

Would You	Percent (%)
Would Bid	18.1
Might Bid	16.0
Would Not Bid	53.1
Other Action	4.6
Don't Know	8.2

4.7 Recreational Access

Leaseholders were surveyed about the status of recreational access and use. The majority of state parcels (62%) had experienced some hunting or fishing use in years previous to the survey (Table 4-27).

Table 4-27. Hunt/ Fish prior years.

Response	Percent (%)
Yes	61.6
No	38.2

Recent status of public access on state parcels tended to be open, followed by access by permission. A small number (3%) reported a block management situation.

Table 4-28. Recent status of public access.

Response	Percent (%)
Open	55.7
By Permission	41.0
Block Management	3.3

While the majority of state parcels were reported to be legally accessible, 23% did report that no legal access existed.

Table 4-29. State parcel legally accessible.

Response	Percent (%)
Yes	77.5
No	22.5

One third of the state leaseholders reported this year to be the first for public access.

Table 4-30. First year for public access.

Response	Percent (%)
Yes	33.0
No	66.0

Respondents holding public leases were asked if they would be willing to pay an additional amount (from $1.00 to $5.00/acre) for the right to control public access to the lease. Leaseholders were generally unwilling to pay for the right to restrict access. Overall, only 12% were willing to bid from $1.00 to $5.00/acre higher to control access. Net willingness to pay was unrelated to bid amount. Complete results of the logit analysis are found in Appendix I.

Table 4-31. Willingness to pay to control public access, bid ($/acre) and responses (n, %).

Bid ($)	Yes	No
1	1	23
	4.2%	95.8%
2	9	24
	27.3%	72.7%
3	2	21
	8.7%	91.3%
4	1	21
	4.6%	95.4%
5	2	19
	9.5%	90.5%
All Levels	15	108
	12.2%	87.8%

The majority (68%) of respondents holding private leases had control of public access (Table 4-32). Of those leaseholders having control of public access, the majority (90%) allowed public access for hunting or fishing (Table 4-33). Access was generally free of charge, although 4 respondents (1.4%) charged a fee, 2 subleased to an outfitter, and 3 reported another arrangement (Table 4-34). About half (54%) of those leasholders not allowing access reported that the landlord did allow hunting or fishing access to the lease (Table 4-35). Generally, the landlord allowed free hunting and fishing (87.6%), although 2.7% charged a fee, and 9.7% had some other arrangement (4-36).

Table 4-32. Leaseholder control of public access, private leases.

Response	Percent (%)
Yes	68.1
No	31.9

Table 4-33. Leaseholder allows public access, private leases.

Response	Percent (%)
Yes	89.7
No	10.3

Table 4-34. Access permitted by leaseholder.

Public Access	Percent (%)
Hunt/Fish for free	96.9
Charge a fee	1.4
Sublease to Outfitter	0.7
Entry under Block Mgt.	0.0
Other	1.0

Table 4-35. Landlord allows public access, private leases.

Response	Percent (%)
Yes	53.9
No	46.1

Table 4-36. Access permitted by landlord.

Public Access	Percent (%), n
Hunt/Fish for free	87.6 (64)
Charge a fee	2.7 (2)
Sublease to Outfitter	0.0
Entry under Block Mgt.	0.0
Other	9.7 (7)

4.8 Attitudes toward Public Leases

Regarding the relative desirability of the different types of leases (question 3, Section F, Appendix E), all things being equal, private leases were the most desirable, followed by State and then Federal leases (Table 4-37). Almost half (49.4%) ranked private best, 14.1% ranked State best, and 7.9% ranked Federal leases best. More than half (51.7%) ranked Federal leases worst, 9.3% ranked State worst, and 10.4% ranked private worst. Farmers not expressing an opinion about lease desirability amounted to 29%.

Table 4-37. Ranking of federal, state and private leases.

Rank	Percent (%)
Federal Best, State so-so, Private worst	6.1
Federal Best, State worst, Private so-so	1.8
Federal so-so, State best, Private worst	4.3
Federal so-so, State worst, Private best	7.5
Federal worst, State best, Private so-so	9.8
Federal worst, State so-so, Private best	41.9
Don't Know	28.7

4.9 Reported average lease rates

Farmers generally reported that cropshare was the most common basis for charging privately

leased cropland in their area (Table 4-38). A notable exception was district 10 (Western Montana), where cash leasing appeared to be more common than cropshare (41% vs.21%).

Table 4-38. Most common method of charging by district.

Type of Charge	Dist 10	Dist 20	Dist 30	Dist 50	Dist 70	Dist 80	Dist 90	AVG
Cash Lease	41.2	12.3	20.0	23.2	25.0	17.2	30.3	19.4
Crop Share	20.6	58.8	41.7	58.0	29.2	48.3	39.4	48.3
About equally divided	38.2	28.9	38.3	18.8	45.8	34.5	30.3	32.3

These apparent differences between districts were not statistically significant (ANOVA , α=0.05).

Reported going cropshare rates for private dryland and irrigated leases are shown in Table 4-39. The highest reported rates were in District 10 (36.6/ 37.8%), the lowest in District 80 (30.1/ 29.0%). Overall, dryland cropshare rates averaged 32.0%, and irrigated rates 33.6%. With the exception of District 80, irrigated cropshare rates were consistently higher than dryland rates.

Table 4-39. Reported going cropshare rates by district.

Land Type	Dist 10	Dist 20	Dist 30	Dist 50	Dist 70	Dist 80	Dist 90	AVG
Dryland	36.6	31.0	32.8	32.3	30.7	30.1	31.6	32.0
Irrigated	37.8	34.6	33.9	33.5	34.5	29.0	32.7	33.6

The majority (68.2%) responded that they thought state school trust cropland leases should be equivalent to the rates reported previously in Table 4-39. Of those responding to the question, 81.5% said the going rate would be a fair price for state leases (Table 4-40). A minority (18.5%) said that cropshares on state cropland leases should be less than the going private rate.

Table 4-40. Fair price for State lease equal going private rate ?

Fair price	Sample (%)	Those Responding (%)
Yes	68.2	81.5
No	15.5	18.5
Don't know or Missing	16.3	--

The respondent estimated fair cropshare rate for state cropland leases is shown in Table 4-41 for all respondents and the subgroup of respondents holding state leases. Overall, farmers estimated that a fair share on state leases would be 31% on average (median 33%). The group holding state leases estimated a somewhat lower fair value, at 28% on average, and 30% median.

Table 4-41. Fair cropshare as estimated by all respondents and state leaseholder subgroup.

Group	Mean	Median	Std Dev	N
All Respondents	30.68	33.00	7.98	835
State Leaseholders	27.74	30.00	7.18	124

Figure 4-3 shows the distribution of farmer estimated fair cropshare rates for the two groups: all respondents, and those holding state leases. The statistics of Table 4-41 were derived from this distribution.

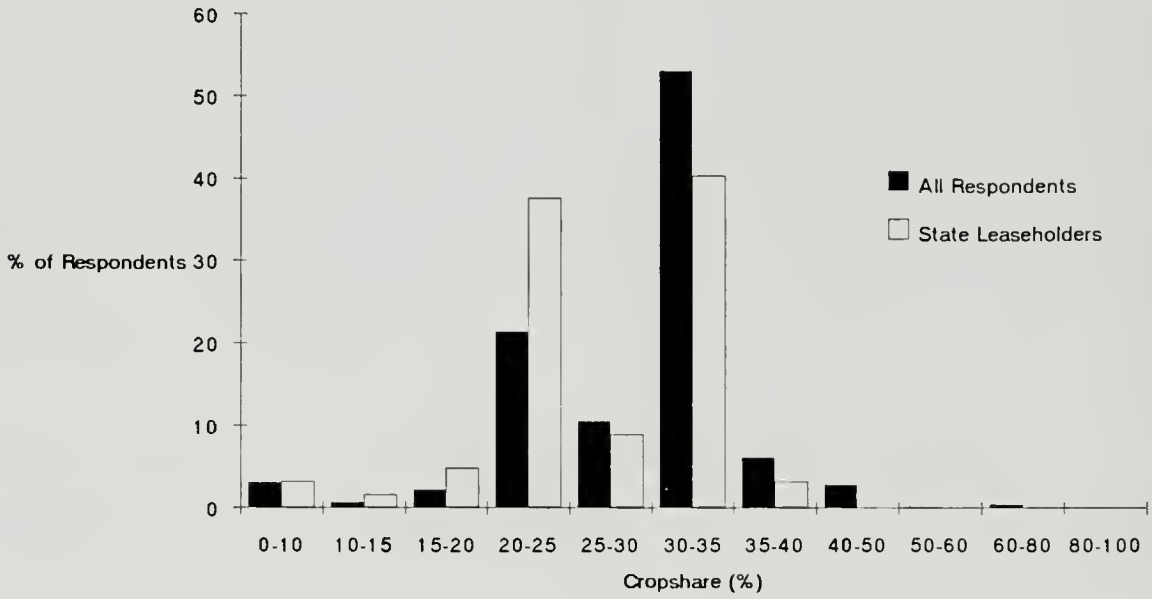

Figure 4-3. Farmer estimated fair cropshare rates for the two primary dryland crops.

4.10 Comparison of DSL Revenues and Total Value of Production for State Leases

In this section we examine the value of production on state agricultural leases for comparison with revenues received from these leased lands. As the cropshare for the state has remained unchanged at 25% since before the 1950's, it was anticipated that the long term ratio of state revenues to value of production for state agricultural leases should approximate 0.25 if the cropshare system has been functioning well. As a means of testing this hypothesis, state cropping patterns and yields were first characterized, and values of production were calculated by crop type and summed. Revenue from land in conservation reserve programs was estimated. Finally, the revenues received from state agricultural leases was regressed on the previous year's estimated total value of production for these leases.

Several cropshare estimates from the regression model are presented. These different estimates reflect a variety of scenarios possible concerning the choice of crop prices and yields used for calculating the value of production on state leases.

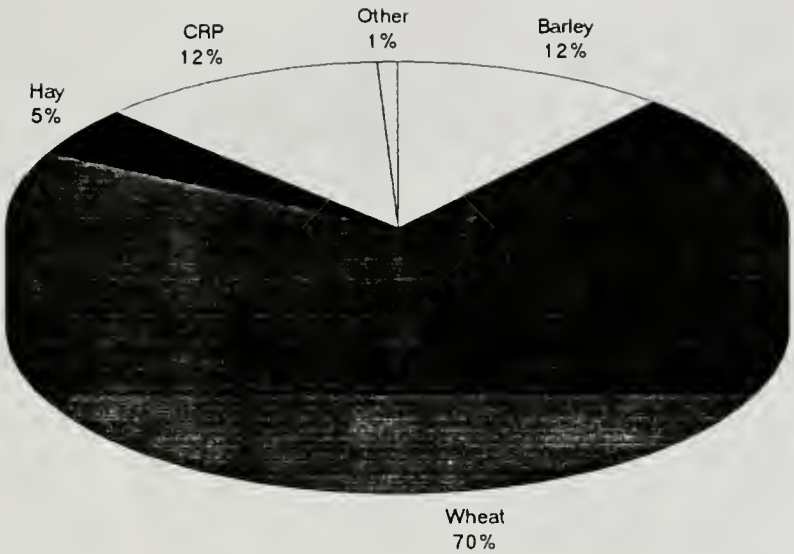

Figure 4-4. Cropping pattern on state agricultural leases, 1992.

Cropping pattern and yields on state agricultural leases

Approximately 61% of the acreage in state agricultural leases was planted; 39% was reported as fallow. This fallow rate is comparable to the rate of 38% for conventional and sustainable farms reported in Duffield et. al. (1993). The reported cropping pattern for state leases is shown in Figure 4-3. Wheat accounted for 71% of the acres planted, and 89% of this was non-irrigated winter and spring wheat on summer fallow. Barley and CRP each accounted for 12%, and hay for an additional 5%. Reported yields for wheat averaged 26.4 bu/ac, and barley averaged 33.7 bu/ac. These represent 88.9% and 77% of the 1992 Montana statewide average. Yields for hay were not calculated as reported units were not comparable. Market prices, target prices, and Montana average yields for wheat, barley and hay are shown in Table 4-42 for the period 1962-1992. Target price figures were not available prior to 1978 for wheat and barley.

Table 4-42. Market prices, target prices, and Montana average yields for 1962-1992.

	Market Prices[1]			Target Prices[2]		MT AverageYields[1]		
Year	Wheat	Barley	Hay	Wheat	Barley	Wheat	Barley	Hay
1962	2.00	0.74	19.20	no data	no data	22.6	30.5	1.17
1963	1.82	0.72	18.50			23.4	29.5	1.14
1964	1.27	0.78	22.00			24.2	32.5	1.15
1965	1.23	0.87	22.00			25.4	38.5	1.17
1966	1.49	0.87	26.00			26.6	38.5	0.99
1967	1.29	0.86	22.50			25.2	29.5	1.13
1968	1.16	0.78	22.50			27.7	37.0	1.12
1969	1.23	0.71	24.00			26.6	42.0	1.17
1970	1.31	0.78	22.50			25.2	38.0	1.23
1971	1.23	0.88	27.50			26.0	35.0	1.13
1972	1.88	1.22	32.00			26.7	37.5	1.25
1973	4.24	2.17	57.00			23.9	30.0	1.12
1974	4.24	2.61	45.50			24.7	30.0	1.16
1975	3.59	2.10	42.00			31.3	39.0	1.38
1976	2.43	2.03	47.50			30.9	44.5	1.34
1977	2.36	1.68	56.00			25.9	36.5	1.22
1978	2.75	1.70	44.00	3.40	2.25	30.2	43.0	1.46
1979	3.56	2.13	55.50	3.40	2.40	22.7	39.0	1.20
1980	4.14	2.83	62.50	3.35	2.42	23.5	42.0	1.20
1981	3.68	2.32	48.50	3.81	2.60	29.7	43.0	1.44
1982	3.55	2.06	50.00	4.05	2.60	33.6	49.0	1.51
1983	3.69	2.40	63.00	4.30	2.60	30.7	42.0	1.22
1984	3.56	2.41	78.00	4.38	2.60	22.6	28.0	1.02
1985	3.47	2.03	84.50	4.38	2.60	12.7	20.0	0.60
1986	2.52	1.60	51.00	4.38	2.60	29.1	39.0	1.28
1987	2.74	1.82	45.00	4.38	2.60	32.2	45.0	1.10
1988	3.98	2.82	85.00	4.23	2.51	15.7	24.0	0.60
1989	3.66	2.21	69.50	4.10	2.43	27.7	43.0	1.20
1990	2.65	2.30	64.00	4.00	2.36	28.1	41.0	1.20
1991	3.10	2.60	52.00	4.00	2.36	36.4	52.0	1.10
1992	3.48	2.35	62.25	4.00	2.36	29.7	44.0	1.23

1.Montana Agricultural Statistics Service, Published Historic State Series 1867-1991, and 1992 report; 2. Agriculture Stabilization and Conservation Service.

Fiscal Year	Revenue ($ Millions)
1962	0.974
1963	1.859
1964	1.847
1965	1.833
1966	2.096
1967	2.627
1968	2.346
1969	2.304
1970	2.357
1971	2.362
1972	2.478
1973	3.074
1974	5.549
1975	5.969
1976	7.049
1977	5.523
1978	4.345
1979	5.645
1980	4.795
1981	6.021
1982	7.490
1983	8.190
1984	8.708
1985	6.321
1986	4.394
1987	7.230
1988	8.892
1989	4.940
1990	7.351
1991	7.562
1992	8.704

Agricultural revenues received from school trust lands by fiscal year are shown in Table 4-43. Agricultural leases amount to about 0.559 million acres in 1992.

Table 4-43. DSL Agricultural State Lease Revenues, 1962-1992.

Three different price scenarios and two crop yield scenarios were used to estimate the cropshare received by DSL on 560,000 acres of leased agricultural land. The results of this are shown in Table 4-44. The long term market scenario calculates revenue for wheat, barley and hay based on market prices reported by Montana Agricultural Statistics Service. Revenue from CRP payments was not included. The target 1978-1992 scenario calculates revenue from target prices for wheat and barley, and market prices for hay. Like the 1978-1992 series, the 1988-1992 target scenario calculates revenue from target prices for wheat and barley, market prices for hay, and also includes revenue from CRP payments.

Based on the figures reported by respondents, about 11.9% of state agricultural lease acreage is in CRP, which amounts to about 40,578 acres. Payments for state land (10 year lease) in CRP fall into three pools of $35, $40, and $45/acre, of which the state receives a 25%-50% share, or about $10/acre on average. This figure for 1992 was used in calculations of total value of production on state leases for the 1988-1992 Target w/CRP estimate, but was not extrapolated prior to this year.

Two crop yield estimates were used in the calculations of crop values. The MT average used yields for all wheat, all barley, and non irrigated hay from the Montana Agricultural Statistics Service. The estimated state lease yields were derived from crop yields reported by respondents holding state leases and growing wheat and/or barley. MT average hay yields were used rather than reported hay yields because the units of reported figures were not always comparable.

The parameter estimates of the slopes of the regressions of DSL revenues on the previous year's value of production (with zero intercept) are shown in Table 4-44. These values represent the estimated state cropshare for the period in question. All regressions were highly significant ($\alpha = .01$), with adjusted r^2 values of 0.97 to 0.99. Estimates of state cropshare ranged from 21% to 28%. These values would suggest that the state is receiving close to a 25% cropshare of total production on state leases.

Table 4-44. Estimates of cropshare actually received by Montana DSL on State Agricultural Leases.

	Crop Yield Assumptions	
Price Assumptions	MT average	Estimated State Lease[a]
1. Long Term Market (no CRP)	0.246	0.280
2. 1978-92 Target (no CRP)	0.225	0.256
3. 1988-92 Target w/ CRP	0.211	0.238

a. Based on ratio of reported production for 1992 to Montana state average production: (Wheat: DSL= 88.9% of MT average; Barley: DSL= 77.0% of MT average).

5.0 INTERPRETATION

5.1 Current Montana Policy

The current Montana policy toward cropland leases on state school trust land was previously described in some detail in Section 1.2. The main feature of that policy is that the basis of charging is a cropshare, with a minimum share of 25% or (as stated in the DSL surface management regulations): "the usual landlord's share prevailing in the district, whichever is greater". In practice 25% is obtained except on tracts for which there has been competitive bidding. There is a preference right which allows the existing tenant, on renewal, to match the highest competing bid.

For fiscal year 1992, there were 560,000 acres of dedicated agricultural lands that returned a revenue of $8,703,800 or $15.54 an acre. Of these, competitive bids had been received on leases including 63,227 acres (or 10.2% of the total agricultural acreage). The average bid received was 32.9% (see Appendix F). This suggests that the average crop share on state lands is a little less than 26%. The listing of competitive bids in Appendix F is by county. It is interesting to note that of 40 counties where competitive bidding occurred, the median high bid is 40% and the most frequent high bid is 50%.

5.2 Policy in Other Western States

Section 1.2 also provides a detailed discussion of policy in other states. The practices in other states suggests several alternatives that might be plausible for Montana. One is a higher crop share rate; some states such as Washington have a crop share up to 33%. Another alternative is using cash rents (dollar/acre basis). This is the practice in most states, including Montana's neighbor states of North Dakota, Idaho and Wyoming. North Dakota has in the recent past charged a flat $15/acre for cropland; Idaho receives an average of $10 to $12 an acre for dryland crops and Wyoming gets about $4 to $11 an acre for dryland wheat. A final alternative is not having preference rights in order to stimulate competitive bidding.

5.3 Evaluation of Current Policy

We will discuss each of the key alternative policies (changed crop share rate, cash rent, and preference rights) in turn.

Four approaches were taken to identifying a fair market value for cropland leases. These are summarized in Table 5-1. Each of these is described in turn, along with our findings with regard to the average cropshare for dryland private market cropshare leases.

A total of 471 private leases and 116 state leases were identified in the survey. About 31% of private leases were on a dollar per acre basis. The average private market lease rate was found to be $37.68 per acre with a range of $2.10 to $200.00. About 55% of private leases were on a cropshare basis. The most typical private market cropshare was found to be 33% with a range of 5% to 75% (Figure 5-1). Almost 60% of all leases were at a one-third cropshare; the other most common cropshares were one-quarter (20% of the sample) and one-half (6% of the sample). In other words, the great majority of private cropshare contracts (a total of 83% of all contracts) were at either one-quarter, one-third or one-half landlord shares.

To summarize with regard to the private market reference price (Table 5-1), the cropshare market is dominated by a single price: the one-third cropshare. It may be noted that in the Department of State Lands surface management regulations, it is stated that the cropshare rental basis shall be "not less than one-fourth of annual crops to the state or the usual landlord's share prevailing in the district, whichever is greater". Other things equal, it appears that the usual landlord's share in most of the state is one-third. As noted in the main report (Table 4-12), about one-third or higher is also the cropshare in all of the Agricultural Statistics Service districts for Montana.

One way to identify the cropshare that may be more specific to state lands is to estimate the mean cropshare for private leases with terms most similar to those on state lands. This is shown as method 1) in part B. of Table 5-1. For private market leases with no services, on dryland, and with terms greater than five years, the mean cropshare is actually greater than one-third (35.7%) though the most typical value for these leases is again one-third.

Table 5-1. Summary of alternative estimates of fair market value for Montana state lands cropland leases.

Estimate	Mean Cropshare	Median Cropshare	Sample Size
A. Private market reference prices			
Dryland private market	32.9	33.0	211
B. Estimates of fair market value for Montana state cropland leases			
1.Dryland private resembling state (no services, terms > 5years).	35.7	33.0	29
2. Hedonic model, statewide average for state leases.	32.6	32.0	95
3. Competitively bid state leases	32.9	----	224
4. Farmer "reported" fair price for dryland state lease			
- All farmers	30.68	33.0	835*
- State leaseholders	27.74	30.0	124*

* number of responses for two primary crop types in the area.

Another approach to estimating a cropshare specific to state lands was based on a statistical model (a so-called "hedonic model") that related lease characteristics and terms to cropshare for private market cropland leases. This model proved to be unsuccessful in explaining cropshare in terms of services or lease characteristics; only variables for location proved to be important. The implied base rate for predicted fair market value of state leases would be with average adjustments for location is 32.6% cropshare. Predicted cropshare rates were about 10% higher for districts 10 and 70 (Northwest and Southwest Montana).

A third approach is to examine the cropshare received by the state on the cropland leases for which there is competitive bidding. The state reports a total 224 leases for which there are competitive bids; the average of these bids is 32.9%. There is no evidence that the croplands that receive competitive bids are different from other state cropland sections in terms of services. Accordingly, the average competitive bid provides another measure of the market value of cropland leases. The reason that most leases do not receive competitive bids is neighbor relations. Only about 25% of respondents reported that they would bid on a neighbor's state land lease, even if it would fit well in their operation.

A fourth approach was to ask farmers what they thought was a "fair price" for state cropland leases. First respondents were asked the "average charge" for privately owned irrigated and non-irrigated land in "your area". The reported averages were 32% and 33.6% respectively. When asked if these going rates would be fair prices for state school trust cropland leases, over 80% said "yes". The weighted average farmer "reported" fair price for dryland state leases for all farmers is a mean of 31% and a median of 33%; the fair price for respondents holding state leases was 28% and a median of 30%.

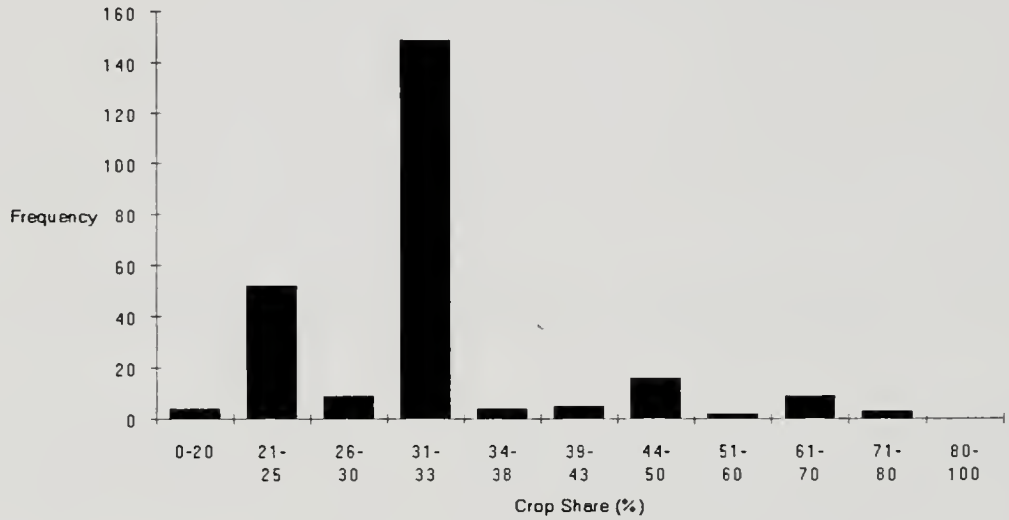

Figure 5-1. Reported Private Crop Share Rates.

All four of the approaches suggest that the fair market cropshare rental on state leases should be about one-third. The lowest median value suggested by any of the approaches is 30%; this is for the farmer's judgemental "fair share" for state leases where it is just the subsample of state leaseholders. We suggest that the evidence points toward a fair market share for state cropland leases of one-third.

The issue of whether the state would be better off with a cash rent system (dollar/acre) is complex. On a superficial level, Montana is doing about as well with a crop share system as the neighboring states that use cash rents. In 1992, Montana averaged $14 an acre while North Dakota (for recent years) obtains $15 and Idaho and Wyoming somewhat less. The main disadvantage of a cash rent approach is that one would probably need to have varying prices reflecting the crop type and productivity of different types of land. This would be more costly and complicated to administer. As the hedonic price modeling ($/acre model) shows, cash rents vary a great deal depending on yields, presence of irrigation, and type of crop. On the other hand, a possible disadvantage of the cropshare is that the state may need to monitor leases to verify actual crop production and values. As noted (Section 1.2), Montana tends to use the "honor system". The DSL surface management regulations do

require tenants to provide copies of all elevator receipts, but it is difficult to segregate production on state parcels from total sales.

A final objective of this analysis was to assess whether the state is receiving the 25% share of crop production. In dryland farming regions such as Montana, states tend to use the "honor system" to obtain their shares of crop production or gross sales. Because most leaseholders farm more than just a state parcel, it is difficult to segregate production from state lands from a farmer's total production. Montana and Washington cite the inability to effectively monitor production on state parcels as a major shortcoming of crop sharing.

As the cropshare for the state has remained unchanged at 25% since before the 1950's, it was anticipated that the long term ratio of state revenues to value of production for state agricultural leases should approximate 0.25 if the cropshare system has been functioning well. As a means of testing this hypothesis, state cropping patterns and yields were first characterized, and values of production were calculated by crop type and summed. Given an historical data set, the revenues received from state agricultural leases was regressed on the previous year's estimated total value of production for these leases.

The 1992 survey provided information on cropping patterns on state leases for that year. In the absence of other information, it was assumed that that cropping pattern (70% wheat, etc.) held into the past. A key assumption is that the percent of land in summer fallow (39%) in 1992 also holds in the past. Yields (bushels per acre) were reported for state leases in our 1992 survey. These yields were somewhat below (about 80%) of yields reported by Montana Agricultural Statistics for all Montana production in 1992. Since we do not have an historical record of state lands yields, we report two approaches in Table 5-2. The first is to assume state lands yields are the same as all Montana lands. This leads to probably conservative "honor system" cropshares. The second approach is to use the approximately 80% of state lands yields to all Montana lands yields observed in 1992 to adjust historical all Montana yields (second column of Table 5-2). There are also several alternative approaches on historical prices. One is to assume that all statelands production historically has sold at market prices for Montana. A second approach is to assume that the farm program target prices are achieved on all state lands production, but no CRP payments. A final approach is to assume that CRP contracts were in place for at least the last five years and that target prices apply. The latter, along with the assumption of state yields at about 80% of historical all Montana yields is probably the most realistic. This particular set of assumptions yields an estimate of average cropshare received of 23.8%. The range across all assumptions is 21% to 28%. A more precise estimate from historical data would require considerable additional information on farm program payments and policy. A more precise estimate for FY 1993 will be possible when all revenues for that year are in as of June 30, 1993. FY 1993 revenues are the ones tied to the 1992 production we sampled.

Table 5-2. Estimates of cropshare actually received by Montana DSL on State Agricultural Leases.

	Crop Yield Assumptions	
Price Assumptions	MT average	Estimated State Lease[a]
1. Long Term Market (no CRP)	0.246	0.280
2. 1978-92 Target (no CRP)	0.225	0.256
3. 1988-92 Target w/ CRP	0.211	0.238

a. Based on ratio of reported production for 1992 to Montana state average production: (Wheat: DSL= 88.9% of MT average; Barley: DSL= 77.0% of MT average).

Our conclusion is that the evidence suggests the "honor system" is working fairly well. Nonetheless, there does appear to be possibly some shortfall. It is possible that additional monitoring by the state would generate revenues in excess of what it would cost to administrate. One additional staff person costing something on the order of $20,000 annually might generate additional revenues on the order of hundreds of thousands of dollars. This individual could develop good computer records of revenues by crop type from state lands. This individual could also monitor any "anomolous" cropshare payments where the payment to the state fell significantly below the payment indicated by comparison of state or county average yields. This computer work could be complimented by field visits.

On the issue of preference rights, we have no direct evidence on how the elimination of these rights would influence bidding on cropland leases. The evidence from other states for grazing leases is that elimination of preference rights has somewhat increased competitive bidding for those types of leases.

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APPENDIX A. Memorandum of Understanding: Montana Department of State Lands & Montana Agricultural Statistics Service (August 26, 1992)

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding is entered into on the date last written below between the Montana Department of State Lands (hereafter referred to as "State Lands") and the Montana Agricultural Statistics Service (hereafter referred to as "Service").

WHEREAS, State Lands is charged with the duty of administering the State of Montana trust lands and obtaining full market value for the disposition of interest in those lands,

WHEREAS, the 1991 Montana Legislature directed State Lands to conduct a study to determine the value of surface uses of state trust lands,

WHEREAS, State Lands has determined that the best means of conducting the economic study is to obtain reliable information from Montana farmers and ranchers by means of polling them,

WHEREAS, the Service has an expertise in polling and has accurate and current names and addresses of farmers and ranchers in Montana,

WHEREAS, the parties determined that it is desirable for the parties to enter into a Memorandum of Understanding to memorialize the procedure whereby the Service will conduct information gathering for State Lands' economic study.

NOW THEREFORE, the parties hereby agree as follows:

1. The Service shall provide State Lands with estimated costs and response rates for implementing a survey of agricultural operators as in paragraph 4. The approach to be used is a phone survey using standard telephone procedures. State Lands will provide a copy of the survey instrument, with the survey to be implemented within the time period September 15 to October 15, 1992. The Service shall provide an estimate of cost of implementing the survey using a telephone procedure. The estimate will include the cost of 1) basic setup for a CATI implemented procedure and 2) per hour costs for interviewers (this cost will include overhead and phone charges). The Service will provide a sample questionnaire and related costs and response broken down by hours for a typical agricultural survey (probably the September agricultural survey).

2. State Lands shall provide the Service with a copy of draft survey instruments and a survey plan. After amendment of this memorandum pursuant to paragraph 8, the Service shall review the instruments and plan and comment upon and make recommended changes

to the instruments and plan using the Service's expertise in the area of survey design.

3. After amendment of this Memorandum pursuant to paragraph 8, the parties shall determine the specific criteria for drawing names for each sample cooperatively. The Service shall provide frequency distributions or other descriptive statistics for the sample frame to inform the choice of sample stratifications. The Service will use the same breakpoints in these frequency distributions as are used in the census of agriculture. A possible breakpoint for the survey would be at 49 acres for cropland, and possibly no stratification for the cattle and sheep list.

4. After amendment of this Memorandum pursuant to paragraph 8, the Service shall survey two samples of Montana agricultural operators. One sample will be 1,000 names on the Service's cropland list. The purpose of this drawing is to investigate the current market terms for the lease of privately owned cropland in Montana. The second sample will be 1,000 names of the cattle and sheep raisers in Montana. The purpose of drawing this sample is to investigate the current market rates and terms for lease of privately owned grazing land in Montana. The method of survey will be by telephone. The sample will be drawn systematically from a ranked array by size of operators for each sample frame. This will be done without replacement to eliminate the problem of individuals being drawn on both lists. At State Lands' request, the Service may implement a pre-test of a size to be determined (probably 100 names) based at the costs specified in paragraph 1.

5. State Lands will provide to the Service an estimate of the total hours of survey time based on the Services sample questionnaire costs and response rates, interpolated for the length of the questionnaires to be implemented. This estimate will be provided within the time frame of August 15 to August 25, 1992.

6. In conducting the surveys pursuant to this agreement, the Service shall use its established procedures for surveying, including preservation of the confidentiality of the respondents. These established procedures include respondents being offered an opportunity to receive a summary of the results of the survey. State Lands will provide the Service with an adequate number of mailable (including postage) copies for this purpose.

7. In any formal publication of the results, the cooperation of the Service will be acknowledged.

8. The Service is not required to perform the duties required in accordance with paragraphs 2, 3 and 4 until such time as this Memorandum is amended to provide payment for those services. The payment will be made by State Lands contractor, Bioeconomics, Inc., and will be in the form of expected total costs up front to be held by the Service until the survey is completed. A check must accompany the completed (amended) Memorandum which should be in place by September 1. If the costs are overestimated, they shall be refunded to Bioeconomics, Inc. If the costs are underestimated,

the parties shall negotiate to establish a reasonable cost figure.

9. This Memorandum may be amended in writing by the parties.

10. This Memorandum is effective on the date last below written and expires on February 1, 1993.

MONTANA AGRICULTURAL STATISTICS

By: James K. Sands 8-26-92
State Statistician Date

MONTANA DEPARTMENT OF STATE LANDS

By: [signature] 8-20-92
Dennis D. Casey, Commissioner Date

APPENDIX B. Pilot Cropland Phone Survey Instrument (July 1992)

Department of State Lands
Farm Land Leasing Survey
August, 1992

Good (Morning ..... Evening)

My name is _____. I am conducting interviews regarding leasing agricultural lands for the Montana Department of State Lands. Your name was systematically (randomly) selected as a farmer or rancher. All information you give will be treated confidentially and processed anonymously to permit statistical summaries. Will you please take the next few minutes to answer questions regarding leasing of agricultural lands?

ID __ __ __ __ __

1.
__ __ What percentage of your operation is farming? Is your operation entirely (100%) primarily or only partially (less than 50%) farming?

2.
__ __ __ __ __ Approximately, how many acres total do you own?
9 Don't Know

3.
__ __ __ __ How many additional acres are leased from someone?
9 Don't Know

4.
__ __ __ __ And, how many acres are leased to someone?

5.
Of the land you lease, how many acres do you lease from:
__ __ __ __ a. private land owners
__ __ __ __ b. State
__ __ __ __ c. USFS
__ __ __ __ d. BLM
__ __ __ __ e. BIA
__ __ __ __ f. Don't Know

6. __ What is the usual basis for renting land in your area?
1 cash lease (payment per piece of land)
2 crop share
3 about equally divided between 1 and 2
4 other _____
9 Don't Know

Each piece of land differs in potential use and value. The following questions are concerned with both general and specific aspects of arriving at fair land leases.

What are the going rates for leasing <u>in your area</u>?

7.
__ __ Cash lease (how much money/acre?)
9 <u>Don't Know</u>

8.
__ __ Crop share (what percent to owner?)
9 <u>Don't Know</u>

Now, regarding the land you lease from others

9. This parcel is
__ 1. private
2. State
3. USFS
4. BLM
5. BIA
9. Don't Know

10. What is grown on this land?
__ 1. crop land
2. seeded pasture
3. native range
4. woodland
5. other _____

11. Is it irrigated?
__ 1. yes
2. no

12.
__ How do you pay for your lease?
1 cash lease
2 crop share
3 other _____
9 Don't Know

How much do you pay for your lease?

13. __ __ If cash lease, how much per acre?

14. __ __ If crop share, what percent do you pay owner?

15.
__ __ What is the length (years) of the rental agreement?

16. How much does the landowner provide for each of the following?

		Nothing	Materials only	Materials, some labor	all costs
__	fencing/structures	_____	_____	_____	_____
__	weed control	_____	_____	_____	_____
__	irrigation system	_____	_____	_____	_____

Now, regarding the land you lease from others

9. This parcel is
__ 1. private
2. State
3. USFS
4. BLM
5. BIA
9. Don't Know

10. What is grown on this land?
__ 1. crop land
2. seeded pasture
3. native range
4. woodland
5. other _____

11. Is it irrigated?
__ 1. yes
2. no

12.
__ How do you pay for your lease?
1 cash lease
2 crop share
3 other _____
9 Don't Know

How much do you pay for your lease?

13. __ __ If cash lease, how much per acre?

14. __ __ If crop share, what percent do you pay owner?

15.
__ __ What is the lengtn (years) of the rental agreement?

16. How much does the landowner provide for each of the following?

		Nothing	Materials only	Materials, some labor	all costs
__	fencing/structures	_____	_____	_____	_____
__	weed control	_____	_____	_____	_____
__	irrigation system	_____	_____	_____	_____

Now, regarding the land you lease from others

9. This parcel is
__ 1. private
2. State
3. USFS
4. BLM
5. BIA
9. Don't Know

10. What is grown on this land?
__ 1. crop land
2. seeded pasture
3. native range
4. woodland
5. other _____

11. Is it irrigated?
__ 1. yes
2. no

12.
__ How do you pay for your lease?
1 cash lease
2 crop share
3 other _____
9 Don't Know

How much do you pay for your lease?

13. __ __ If cash lease, how much per acre?

14. __ __ If crop share, what percent do you pay owner?

15.
__ __ What is the length (years) of the rental agreement?

16. How much does the landowner provide for each of the following?

		Nothing	Materials only	Materials, some labor	all costs
__	fencing/structures	_____	_____	_____	_____
__	weed control	_____	_____	_____	_____
__	irrigation system	_____	_____	_____	_____

Now, regarding the land you lease from others

9. This parcel is
__ 1. private
2. State
3. USFS
4. BLM
5. BIA
9. Don't Know

10. What is grown on this land?
__ 1. crop land
2. seeded pasture
3. native range
4. woodland
5. other _____

11. Is it irrigated?
__ 1. yes
2. no

12.
__ How do you pay for your lease?
1 cash lease
2 crop share
3 other _____
9 Don't Know

How much do you pay for your lease?

13. __ __ If cash lease, how much per acre?

14. __ __ If crop share, what percent do you pay owner?

15.
__ __ What is the length (years) of the rental agreement?

16. How much does the landowner provide for each of the following?

		Nothing	Materials only	Materials, some labor	all costs
__	fencing/structures	_____	_____	_____	_____
__	weed control	_____	_____	_____	_____
__	irrigation system	_____	_____	_____	_____

Now, regarding the land you lease from others

9. This parcel is
__ 1. private
2. State
3. USFS
4. BLM
5. BIA
9. Don't Know

10. What is grown on this land?
__ 1. crop land
2. seeded pasture
3. native range
4. woodland
5. other _____

11. Is it irrigated?
__ 1. yes
2. no

12.
__ How do you pay for your lease?
1 cash lease
2 crop share
3 other _____
9 Don't Know

How much do you pay for your lease?

13. __ __ If cash lease, how much per acre?

14. __ __ If crop share, what percent do you pay owner?

15.
__ __ What is the length (years) of the rental agreement?

16. How much does the landowner provide for each of the following?

		Nothing	Materials only	Materials, some labor	all costs
__	fencing/structures	____	____	____	____
__	weed control	____	____	____	____
__	irrigation system	____	____	____	____

17. For Leasee

How important is each of the following considerations for leasing this land to you? Please indicate whether it is very important, very irrelevant or somewhere in between.

		Very Important	Important	Neutral	Not Important	Totally Irrelevant
___	Healthy, trouble-free piece of land	___	___	___	___	___
___	Need for total operation	___	___	___	___	___
___	Fair price	___	___	___	___	___
___	Close to home	___	___	___	___	___
___	Honest, trusting landlord	___	___	___	___	___
___	Control over use of land	___	___	___	___	___
___	Control of access	___	___	___	___	___
___	Presence irrigation/ subirrigation	___	___	___	___	___
___	Easily accessible road	___	___	___	___	___
___	Close to market	___	___	___	___	___

Now, regarding the land you lease to others.

18.
__ What is grown on this land?
1. crop land
2. seeded pasture
3. native range
4. woodland
5. other _____

19. Is it irrigated?
__ 1. yes
2. no

20.
__ How are you paid for your lease?
1 cash lease
2 crop share
3 other
9 Don't Know

How much are you paid for your lease?

21.
__ __ If cash lease, how much money per acre?

22.
__ __ If crop share, what percent do you receive?

23.
__ __ What is the length of your rental agreement?
1. yearly
2 2-5 years
3 6+ years
9 Don't Know

24. How much of the following items do you provide to the lessee?

		Nothing	Materials only	Materials, some labor	all costs
__	fencing/structures	_____	_____	_____	_____
__	weed control	_____	_____	_____	_____
__	irrigation system	_____	_____	_____	_____

Now, regarding the land you lease to others.

18.
__ What is grown on this land?
1. crop land
2. seeded pasture
3. native range
4. woodland
5. other _____

19. Is it irrigated?
__ 1. yes
2. no

20.
__ How are you paid for your lease?
1 cash lease
2 crop share
3 other
9 Don't Know

How much are you paid for your lease?

21.
__ __ If cash lease, how much money per acre?

22.
__ __ If crop share, what percent do you receive?

23.
__ __ What is the length of your rental agreement?
1. yearly
2 2-5 years
3 6+ years
9 Don't Know

24. How much of the following items do you provide to the lessee?

		Nothing	Materials only	Materials, some labor	all costs
__	fencing/structures	_____	_____	_____	_____
__	weed control	_____	_____	_____	_____
__	irrigation system	_____	_____	_____	_____

Now, regarding the land you lease to others.

18.
__ What is grown on this land?
1. crop land
2. seeded pasture
3. native range
4. woodland
5. other _____

19. Is it irrigated?
__ 1. yes
2. no

20.
__ How are you paid for your lease?
1 cash lease
2 crop share
3 other
9 Don't Know

How much are you paid for your lease?

21.
__ __ If cash lease, how much money per acre?

22.
__ __ If crop share, what percent do you receive?

23.
__ __ What is the length of your rental agreement?
1. yearly
2 2-5 years
3 6+ years
9 Don't Know

24. How much of the following items do you provide to the lessee?

		Nothing	Materials only	Materials, some labor	all costs
__	fencing/structures	____	____	____	____
__	weed control	____	____	____	____
__	irrigation system	____	____	____	____

For Lessor

25. How important is each of the following considerations for leasing this land to someone else?

	Very Important	Important	Neutral	Irrelevant	Very Irrelevant
__ Healthy, trouble-free piece of land	____	____	____	____	____
__ Fits in with total investment/operation	____	____	____	____	____
__ Fair price	____	____	____	____	____
__ Honest, trustworthy lessee	____	____	____	____	____
__ Lessee controls use of land	____	____	____	____	____
__ Lessee controls access to land	____	____	____	____	____

26. What do you believe about the following items

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
__ State leases tend to be bargains in comparison to private leases	____	____	____	____	____
__ Decisions on how to use leased land should be entirely the decision of the renter	____	____	____	____	____
__ Decisions on how to use leased land should be entirely the decision of the owner	____	____	____	____	____
__ Hunting access on government leases should be solely the control of the renter	____	____	____	____	____
__ Matching bids make fair leasing on public lands	____	____	____	____	____
__ For land owners to grant permission to hunt and fish to the public with reservation	____	____	____	____	____

27. Respondent Demographic characteristics

__ __ Age

__ Education
1 High School or less
2 High School plus
3 BA +

__ Occupation Primary
1 Agriculture
2 Blue Collar
3 White Collar

__ Generation on this property

__ Marital Status
1 Single
2 Married

__ __ Percent income derived off farm

APPENDIX C. Final Report, Cropland Lease Pre-Survey, Dr. Patrick Jobes (August, 1992)

Montana State University
Bozeman, Montana 59717

Department of Sociology
College of Letters and Science

Telephone (406) 994-4201

August 3, 1992

To: John Duffield

From: Patrick C. Jobes

Re: Questionnaire

The enclosed packet contains:

1. The most recent revision of the interview schedule developed during several phases.

2. Copies of completed and coded questionnaires drawn from a random sample of farmers and ranchers in Montana.

3. Comments concerning issues relevant to the final development, administration and interpretation of the instrument.

4. An invoice for the work completed. All of the hours were actually used up. I left one hour on the invoice to encourage you to call me, if you had any questions.

The questionnaire was tested in each of the various phases of development. The last phases worked effectively. It was initially administered to respondents I knew. The last 20+ interviews were with respondents who did not know me and with whom there had been no prior appointment. There was not a single refusal. That is amazing. After administering the instrument, each respondent was asked what, if any, information was missing or should have been asked. By the last phase respondents had no further suggestions.

The precoded categories work. They are not the only categories which could be used, of course. Initially, precoded categories were used for qualitative levels of acreage and for amount of operation devoted to farming. In the last version actual number of acres; total, leased from, and leased to, were recorded without bothering to categorize them. Setting cutting points after the data all are in the computer will be more valid and more precise than presetting qualitative categories. Copies of the original interviews are included along with copies which have been recoded to a later version.

There are many issues which have no easy solution yet have profound implications with regard to fair pricing based on a preestablished schedule.

A. Enormous variation in land quality exists.

1. The suitability of land for particular crops is one parameter. E.g. land suitable for small grain, overall, is more valuable than a single cutting of hay.

2. The condition of land can make otherwise similar acreage vary in value for idiosyncratic reasons. The presence of weeds or an old dumpsite, for example, can detract from value.

3. Any given parcel of land may not be easily classified by one use. A half section may have 80 acres suitable for grain, 80 for hay and the rest for grazing. Even a piece solely devoted to hay, may have some subirrigated acreage making it more productive and valuable than hay land without such a productive section.

4. Setting a point estimate for the value of a type of land will be very questionable. A range or a standard deviation probably is a more valid approach. For example,

   What are the going rates for crop land in your area?

   <u>Cash Lease</u>

   __ __ Low
   __ __ High

   <u>Crop Share</u>

   __ __ Low
   __ __ High

   Greatest precision would require such a range for each type of crop grown, and for irrigated or not irrigated. Such specification would be cumbersome.

B. No clear distinction occurs between farmers and ranchers. Few persons interviewed maintain no livestock. And, all ranches interviewed harvested considerable hay, which clearly is farming. Many raised small grains, hay and cattle.

1. Most land owners who lease out land are more difficult to identify than are farmers. The land owners are likely to be absentee owners or retired farmers. The lessors in the sample interviewed were picked up purely by chance. That may be 15-20 percent of farmers. Does our list identify owners who lease out land?

2. Conversion of pasture leased in animal units is very complicated and varies considerably from one agency to another.

C. Similar variation occurs in informal agreements that off-set conventional variables. A land owner may provide machinery or even another piece of land without charge as part of the exchange instead of charging a fee or providing the usual trades, such as fencing, chemicals or equipment and ditch maintenance.

1. There is an unwritten rule in eastern and northern Montana that neighbors usually do not bid against neighbors who have government leases. This is an especially interesting matter since it contrasts the sacred i.e., the social, with the profane, i.e., the economic. It is a classic example of the inadequacy of pure rational-economic decision making models when informal social structures are well developed.

2. While most private leases are technically on a yearly basis realistically they often are perpetual, having been held for decades. Again, this is a "sacred" matter rather than a pure matter of dollars. Such leases also seem most often settled by hand shake and verbal agreement rather than by written contract.

3. Owners of irrigated lands usually pay for water and for equipment maintenance on wells or pumps. These should be considered as materials.

4. I did not ask questions regarding hunting leases. Instead, if hunting leasing or access were mentioned, the responses were recorded. Brian and I decided not to force choices on this issue during the pilot study. The questions will work and should be asked on the survey. A category of "wildlife" could be added to question #10, if identification of that use is of interest. It certainly increases the value of some low cost pasture.

5. Without asking, <u>every</u> respondent said they were married or widowed.

6. Family members often are leasing to or from other family members. They tend to offer more generous terms than occurs in other leases. Again, this is a sacred vs secular issue.

7. There was some resistance to giving information about prices. One said he did not want to answer those questions. Three others said

they couldn't remember.

D. The questions with Likert-type responses, i.e. #17, 25 and 26, could be asked in order of rank-preference. The Likert method also can be indexed and scaled. And, it has the advantage of providing qualitative information about which category people responded to. The rank-preference more clearly forces respondents to place responses in order, but lacks such qualitative information. People might discriminate among several categories, but all might be important.

E. Some respondents offered that the State is extremely cooperative to work with but, that the State does not always take conscientious care of its land. For example, they were reported as not protecting riparian quality, allowing weeds to develop and calculating more animal units than would be permitted by other owners. The following general questions could be added to Question #26.

1. In this area the State tends to manage its land more protectively than do private owners.

2. Or, more questions could be added to specify weed control, riparian protection and number of animal units permitted on the land.

APPENDIX D. Mailing to Cropland Survey Sample from Montana Agricultural Statistics (September 22 1992).

MONTANA AGRICULTURAL STATISTICS SERVICE

U.S. DEPARTMENT OF AGRICULTURE COOPERATING WITH MONTANA DEPARTMENT OF AGRICULTURE

P.O. BOX 4369 – HELENA, MONTANA 59604

(406) 449-5303

September 22, 1992

Dear Montana farmer:

The Montana Agricultural Statistics Service has been asked to conduct a survey concerning cropland leases. This study is at the request of the Montana State Legislature and is in cooperation with the Montana Department of State Lands.

Your name was randomly drawn from our list of Montana cropland operators. The survey will be conducted by telephone. We are writing to let you know that we will phone you sometime in the next few weeks. We have found that survey participants appreciate this advance notice. It gives you an idea of the kind of questions we will be asking and provides you with an opportunity to research your records if necessary. This makes our survey more efficient--saving time both for you and our phone survey staff.

Following this introductory letter, we have listed many of the questions that you will be asked. You can look these over at your leisure. It may be that you can answer all of these questions off the top of your head. For some of the questions you may need to refer to your records. It may be helpful for you to keep this letter and any notes near your phone for your reference when we call for your interview. At that time, if we happen to catch you at an inconvenient moment, we will be happy to call you back at the time you specify.

Your name was randomly drawn to represent a particular size of farm. In order for our survey to be representative, it is very important that we obtain information about your operation. As with all of our surveys, your responses are completely confidential and are never associated with your name. If you so desire, we will be glad to provide you with a copy of the survey results. We will ask you about this during the telephone interview. We hope to have results to mail out in January.

We look forward to talking with you. Thank you in advance for taking the time to help us on this survey. Should you have any questions for us please feel free to call Curt Lund or myself at 1-800-835-2612.

Sincerely,

James K. Sands

James K. Sands
State Statistician

INSTRUCTIONS FOR SURVEY PARTICIPANTS: The following questions represent most of the questions you will be asked in your telephone interview. Every respondent will be asked the questions in Section A and Section E. If you are a tenant or landlord on a cropland lease, you will be asked the questions in Section D for up to four of your largest leases (2 largest private leases, and largest state lease, and largest other public lease, or, if no state lease, your 2 largest other public leases).

SECTION A - ACRES OPERATED

1. The total acres operated under this land arrangement, include farmstead, all cropland, woodland, pastureland, wasteland, and government program land.

   1a. On July 1, how many acres did this operation **own**? . . . . . Acres

   1b. How many acres did this operation **Rent from others**? (Exclude land used on an animal unit month (AUM) basis) . . . . . Acres

   1c. How many acres are used on a fee per head or animal unit month (AUM) basis, rented either from a public agency or a private party? . . . . . Acres

   1d. Rent to others . . . . . Acres

   1e. Then the total acres operated under this arrangement are (1a + 1b + 1c-1d) Total Acres

SECTION B - GENERAL QUESTIONS FOR TENANTS

1. What percentage of your operation is farming (as opposed to livestock) . . . . . Percentage Farming

2. What is the size of your farming operation in terms of total acres of cropland (include land leased)? . . . . . Acres Cropland

3. How many nongrazing agricultural leases do you hold from:

	Number of Leases	Total Acres
a. Private		
b. State		
c. BLM		
d. Forest Service		
e. BIA		
f. Other Public Agency: (specify)		

SECTION C - GENERAL QUESTIONS FOR LANDLORDS

1. You previously listed (item 1d)_____ acres of your operation as being rented out to other operators. How many of these acres are leased from you for cropland? . . . Acres

2. How many separate such agricultural leases have you let? . . . . . Number of leases

SECTION D - INFORMATION ON EACH LEASE - LANDLORD OR TENANT

Now I'd like to ask you some questions specific to the cropland lease(s) you hold either as a tenant or landlord. IF MORE THAN ONE, let's start with the largest private lease.

1. How many acres is this lease for: . . . . . Acres ☐

2. Is this lease an inholding in the sense that it is totally surrounded by private ground?

   ☐ YES ☐ NO IF YES, is this inholding fenced separately? ☐ YES ☐ NO

3. As of July 1, what types of crops were being raised on this lease, how many acres are in each crop and what is the expected or actual average yield per acre?

CROP TYPE	ACRES PLANTED	YIELD PER ACRE

Was any of this lease in summer fallow as of July 1? . . . . . If yes, Number of Acres ☐

4. What is the basis for the rental on this particular lease and what is the rental rate?

	RATE
☐ CASH . . . . . dollars/acre	☐
☐ CROPSHARE . . . . . percentage to landlord	☐
☐ OTHER (specify) . . . . _____	☐

5. What is the length (years) of the rental agreement on this lease? . . . . . Term in Years ☐

6. How many years has this lease been held by the tenant's operation? . . . . . Years held ☐

7. For this lease, I'd like to know what services the landowner provides. I will read you a list of specific services and you can tell me if the landowner provides nothing, materials only, materials and some labor, or if the landowner covers all costs:

Landlord Provides:	Nothing	Materials Only	Materials, Some Labor	All Costs
a. Fence construction				
b. Fence maintenance				
c. Irrigation system				
d. Buildings & machinery storage				
e. Crop storage				
f. Weed control				
g. Insect & disease control				
h. Fertilizer				

8. Is there a noxious weed problem on this lease? ☐ YES ☐ NO

If Yes, what was the actual cost to you over the last 12 months of weed control on this lease including your labor and equipment time? . . . . . Dollars

9. Do you control public access for fishing or hunting on this lease? ☐ YES ☐ NO

If Yes, do you allow access for hunting or fishing on this lease? ☐ YES ☐ NO

If Yes, do you :

☐ Allow people to hunt and fish for free

☐ Charge a fee: . . . . . Dollars per day

(Add comment if other terms) _____

☐ Sublease to an outfitter . . . . . Dollar Amount

☐ Allow entry under block management

NOTE TO RESPONDENTS: If you have more than one lease (either tenant or landlord status), the preceding section (D) may be repeated for your next largest private lease and up to two of your largest state or federal leases.

SECTION E - GENERAL QUESTIONS ON LEASING (for all respondents)

1. What is the usual basis for renting privately owned cropland in your area?

☐ Cash lease (payment per piece of land)

☐ Crop share

☐ About equally divided between cash and crop share

☐ Other:_____

2. What are the current average market rates for leasing privately owned cropland for the major crop types in your area?

	Crop Type	Dryland	Irrigated
A. Cash Lease			
Dollars per acre			
B. Crop Share			
Percent to Landowner			

Thanks very much for taking the time to look over our questions. At the time of your phone interview, we will ask you if you have any other comments you would care to make on the issue of leasing cropland in Montana.

APPENDIX E. Final Phone Survey Instrument, Cropland Survey (September 1992).

INSTRUCTIONS: This paper questionnaire will help explain the large Blaise survey instrument. Only one copy of each type of lease arrangement is included. The Blaise instrument will select the proper number and type of leases for your interview.

- o No respondent **WILL BE** asked to complete more than **4 lease arrangements.**
- o The priority for selection is: two largest private leases used as a tenant; two largest public leases with the largest State selected first followed by largest Non-State, two largest landlord leases.
- o For example: a respondent that has 4 private leases as a tenant and 2 State leases, would complete 2 private and 2 State leases. A respondent with 3 State leases and 2 BIA leases would complete 1 State and 1 BIA. A respondent with 4 State leases will fill out 2 State leases. A respondent with 1 private lease as a tenant and is landlord of 3 leases would complete 1 private as a tenant and 2 as a landlord.

SECTION A - ACRES OPERATED

1. Please report for the total acres operated under this land arrangement, including the farmstead, all cropland, woodland, pastureland, wasteland, and government program land.

   1a. How many acres does this operation own? . . . . . Acres ☐

   1b. How many acres does this operation Rent from others? (Exclude land used on an animal unit month (AUM) basis) . . . . . Acres ☐

   1c. How many acres does this operation rent to others . . . . . Acres ☐

   1d. How many acres are used on a fee per head or animal unit month (AUM) basis, rented either from a public agency or a private party? . . . . . Acres ☐

   1e. Then the total acres operated under this arrangement are (1a + 1b-1c + 1d) Total Acres ☐

2. Of the non-AUM land, how many acres would be considered cropland? . . . . . Acres ☐

3. Of the non-AUM land, how many acres of CRP are there? . . . . . Acres ☐

4. What percentage of the gross sales on your operation is from crops as opposed to livestock . . . . . Percent Crop Sales ☐

SECTION B - LEASING QUESTIONS FOR TENANTS

1. On July 1, how many cropland leases did you hold from:

	Number of Leases	Total Cropland Acres
a. Private		
b. State		
c. BLM		
d. Forest Service		
e. BIA		
f. Other Public Agency: specify:		

IF NO LEASES, GO TO SECTION D.

SECTION C - INFORMATION ON EACH LEASE - TENANT

Now I'd like to ask you some questions specific to the cropland lease(s) you hold. IF MORE THAN ONE, let's start with the largest private lease.

2. How many acres of cropland is in this lease: . . . . . Acres ☐

3. Is this lease an inholding in the sense that it is totally surrounded by private ground?

☐ YES ☐ NO IF YES, is this inholding fenced separately? ☐ YES ☐ NO
IF NO, ask 3A and 3B below.

3A. What is the distance in miles of this lease from your base operation? . . . . . Miles ☐

3B. Is there anything about the location or access to this lease that limits its marketability? ☐ YES ☐ NO
IF YES, What? Please comment _____

4. As of July 1, what were the five largest crops raised on this lease, how many acres were planted and harvested for each crop and what is the expected or actual average yield per acre?

CROP TYPE	ACRES PLANTED	ACRES HARVESTED	YIELD PER ACRE

5. What were the total number of acres in this lease that were summer fallow in 1992? . Acres ☐

6. What percentage of this lease is considered to be dryland, sub-irrigated, and irrigated?

Dryland		Sub-Irrigated		Irrigated	Percentage
	+		+		= 100 percent

7. What is the basis for the rental on this particular lease and what is the rental rate?

RATE

☐ CASH . . . . . dollars/acre ☐

Regarding the cash lease, if Question 5 has acreage reported for summerfallow, were you paying on the basis of ☐ total acres or ☐ productive acres?

☐ CROPSHARE . . . . . percentage to landlord ☐

☐ OTHER (specify) . . . . _____ ☐

8. What is the length in years of the rental agreement on this lease? . . . . . Term in Years ☐

9. How many years has this lease been held by this operation? . . . . . Years held ☐

10. Is this lease arrangement with a relative? ☐ YES ☐ NO

11. For this lease, I'd like to know what services the landowner provides. I will read you a list of specific services and you can tell me if the landowner provides nothing, materials only, labor only, materials and some labor, or if the landowner covers all costs:

Landlord Provides:	Nothing	Materials Only	Labor Only	Materials, Some Labor	All Costs	Other: Specify Below
a. Fence construction						
b. Fence maintenance						
c. Irrigation system(s)						
d. Buildings & machinery storage						
e. Grain storage						
f. Weed control						
g. Insect & disease control						
h. Fertilizer						

OTHER ARRANGEMENTS: _____

_____

12. Is there a noxious weed problem on this lease? ☐ YES ☐ NO

If Yes, what was the actual cost to you over the last 12 months for weed control on this lease including your labor and equipment? . . . . . Dollars ☐

13. Do you essentially have the right to manage this lease as if it was your own ground in terms of choice of crops, use of fertilizer, herbicides, planting time, etc.? ☐ YES ☐ NO

COMMENTS: _____

_____

14. How would you rate the productivity of this lease in terms of crop yields on a scale of: ☐ excellent, ☐ good, ☐ fair, or ☐ poor?

15. If this lease is irrigated, how would you rate the effectiveness of the irrigation system in terms of crop yields on this lease on a scale of: ☐ excellent, ☐ good, ☐ fair, or ☐ poor?

16. How would you rate the reliability of production of this lease in the event of drought on a scale of: ☐ excellent, ☐ good, ☐ fair, or ☐ poor?

ASK QUESTIONS 17 and 18 <u>ONLY</u> IF IT IS A STATE LEASE

17. To your knowledge, has there ever been a competing bid submitted to lease this parcel of land?

☐ YES

☐ NO, Can you speculate as to why no one else has bid on this lease? I will read you some possible reasons and you can tell me which reasons apply:

☐ 1. Inholding status ☐ 3. Neighbor relations

☐ 2. Cost of enclosure ☐ 4. Other (specify)_____

18. To your knowledge, has public or outfitted hunting or fishing use occurred on this lease in previous years, prior to 1992?

☐ YES What has generally been the recent status of public access on this lease?

☐ 1. Open access. ☐ 3. Block management.

☐ 2. By permission only. ☐ 4. Generally closed.

☐ 5. Other (specify) _____

☐ NO

19. Is this lease legally accessible by the public in the sense that there is an established public road or right-of-way or easement to the lease or it is accessible through adjacent public lands?

☐ YES:

IF YES, ASK IF NOT A PRIVATE LEASE:

Would you be willing to pay additional dollars per acre if you could control public recreational access on this lease? ☐ YES ☐ NO

IF YES, what is the main reason you would be willing to pay this amount?

_____

☐ NO _____

ASK QUESTION 20 ONLY IF PRIVATE LEASE.

20. Do you control public access for fishing or hunting on this lease? ☐ YES ☐ NO

If YES, do you allow access for hunting or fishing on this lease? ☐ YES ☐ NO

If Yes, do you :

☐ Allow people to hunt and fish for free

☐ Charge a fee: . . . . . Dollars per day ☐

(Please specify if not charged per day) _____

☐ Sublease to an outfitter . . . . . Dollar Amount ☐

☐ Allow entry under block management

☐ Other (specify) _____

IF NO, does your landlord allow access for hunting or fishing on this lease? ☐ YES ☐ NO

If Yes, does landlord:

☐ Allow people to hunt and fish for free

☐ Charge a fee: . . . . . Dollars per day ☐

(Add comment if not charged per day) _____

☐ Sublease to an outfitter . . . . . Dollar Amount ☐

☐ Allow entry under block management

☐ Other (specify) _____

NOTE: Section C may need to be completed for additional leases as specified in the instructions.

SECTION D - GENERAL QUESTIONS FOR LANDLORDS

1. You previously listed (item 1c)_____ acres of your operation as being rented out to other operators. How many of these acres are leased from you for cropland? . . . Acres ☐

2. How many separate such cropland leases have you let? . . . . . Number of leases ☐

SECTION E - INFORMATION ON EACH LEASE - LANDLORD

Now I'd like to ask you some questions specific to the cropland lease(s) you hold as a landlord. IF MORE THAN ONE, let's start with the largest lease.

1. How many acres of cropland is in the largest lease? . . . . . Acres ☐

2. Is this lease an inholding in the sense that it is totally surrounded by private ground?

☐ YES ☐ NO IF YES, is this inholding fenced separately? ☐ YES ☐ NO
IF NO, ask 2A and 2B below.

2A. What is the distance in miles of this lease from your tenant's base operation? . . . . . Miles ☐

2B. Is there anything about the location or access to this lease that limits its marketability? ☐ YES ☐ NO

IF YES, What? Please comment_____

3. As of July 1, what were the five largest crops raised on this lease, how many acres were planted and harvested for each crop and what is the expected or actual average yield per acre?

CROP TYPE	ACRES PLANTED	ACRES HARVESTED	YIELD PER ACRE

4. What were the total number of acres in this lease that were summer fallow in 1992? Acres ☐

5. What percentage of this lease is considered to be dryland, sub-irrigated, and irrigated?

Dryland		Sub-Irrigated		Irrigated	Percentage
	+		+		= 100 percent

6. What is the basis for the rental on this particular lease and what is the rental rate?

RATE

☐ CASH . . . . . dollars/acre ☐

Regarding the cash lease, if Question 4 has acreage reported for summerfallow, were you paying on the basis of ☐ total acres or ☐ productive acres?

☐ CROPSHARE . . . . . percentage to landlord ☐

☐ OTHER (specify) . . . . _____ ☐

7. What is the length in years of the rental agreement on this lease? . . . . . Term in Years ☐

8. How many years has this lease been held by your tenant's operation? . . . . . Years held ☐

9. Is this lease arrangement with a relative? ☐ YES ☐ NO

10. For this lease, I'd like to know what services you, the landowner, provide. I will read you a list of specific services and you can tell me if you provide nothing, materials only, labor only, materials and some labor, or if you, the landowner, cover all costs:

Landlord Provides:	Nothing	Materials Only	Labor Only	Materials, Some Labor	All Costs	Other: Specify Below
a. Fence construction						
b. Fence maintenance						
c. Irrigation system(s)						
d. Buildings & machinery storage						
e. Grain storage						
f. Weed control						
g. Insect & disease control						
h. Fertilizer						

OTHER ARRANGEMENTS: _____

_____

11. Is there a noxious weed problem on this lease? ☐ YES ☐ NO

If Yes, what was the actual cost to you over the last 12 months for weed control on this lease including your labor and equipment? . . . . . Dollars ☐

12. Does your tenant essentially have the right to manage this lease as if it was his own ground in terms of choice of crop, use of fertilizer, herbicides, planting time, etc.? ☐ YES ☐ NO

COMMENTS: _____

_____

13. How would you rate the productivity of this lease in terms of crop yields on a scale of: ☐ excellent, ☐ good, ☐ fair, or ☐ poor?

14. If this lease is irrigated, how would you rate the effectiveness of the irrigation system in terms of crop yields on this lease on a scale of: ☐ excellent, ☐ good, ☐ fair, or ☐ poor?

15. How would you rate the reliability of production of this lease in the event of drought on a scale of: ☐ excellent, ☐ good, ☐ fair, or ☐ poor?

16. Have you retained control of public access for fishing or hunting on this lease? ☐ YES ☐ NO

If YES, do you allow access for hunting or fishing on this lease? ☐ YES ☐ NO

If Yes, do you:

☐ Allow people to hunt and fish for free

☐ Charge a fee: . . . . . Dollars per day ☐

(Add comment if not charged per day) _____

☐ Sublease to an outfitter . . . . . Dollar Amount ☐

☐ Allow entry under block management

☐ Other (specify) _____

QUESTION 16 continued:

If NO, does your tenant allow access for hunting or fishing on this lease? ☐ YES ☐ NO

If Yes, does tenant:

☐ Allow people to hunt and fish for free

☐ Charge a fee: . . . . . Dollars per day ☐

(Add comment if not charged per day) _____

☐ Sublease to an outfitter . . . . . Dollar Amount ☐

☐ Allow entry under block management

☐ Other (specify) _____

NOTE: Section E may need to be completed for one more lease. See Instructions.

SECTION F - GENERAL QUESTIONS ON LEASING (for all respondents)

1. What is the usual basis for renting privately owned cropland in your area?

☐ Cash lease (payment per piece of land)

☐ Crop share

☐ About equally divided between cash and crop share

☐ Other:_____

2. What are the current average market rates for leasing privately owned cropland for the major crop types in your area?

	CASH LEASE: $/Acre		CROPSHARE: % to Landlord	
List Crop Type	Dryland	Irrigated	Dryland	Irrigated

3. Do you think that in your area a fair price for state school trust land cropland leases would be 100 percent of the average price you gave me for the crops you reported above?

☐ YES

☐ NO, 3A. What is the main reason that you think state leases should be priced below the market?

_____

_____

3B. For comparable ground, terms and services, what do you think would be a fair price for leasing cropland on the average state school trust lands in your area as a percentage of the price you gave me for the crops previously reported? _____ Percent

4. How would you rank the desirability of a federal versus a state versus a private agricultural lease if they were all on comparable ground? Choose one:

☐ 1. Federal best, state so-so, private worst
☐ 2. Federal best, state worst, private so-so
☐ 3. Federal so-so, state best, private worst
☐ 4. Federal so-so, state worst, private best
☐ 5. Federal worst, state best, private so-so
☐ 6. Federal worst, state so-so, private best

5. Suppose that there was a state lands cropland lease in your area that could work well in your farming operation, but the lease is currently held by a neighbor. At the time of lease renewal, would you submit a competitive bid? Choose one:

☐ 1. I would submit a bid
☐ 2. I might submit a bid
☐ 3. I would not submit a bid out of consideration for my neighbor
☐ 4. Other action (specify) _____

6. Are there any other comments you would care to make on the issue of cropland leasing rights in Montana?

_____

_____

7. Would you like to receive a copy of the results of this survey? ☐ YES ☐ NO

NAME:_____ DATE: _____ PHONE:_____

APPENDIX F. Competitive Bids on DSL Grazing and Agricultural Lands, Acreages by Land Type.

Statewide Competitive Bid Summary (MTCOMBID.WK1) Last Update 19-Oct-92

COUNTY	Total Bids	Grazing Land #	Grazing Land Average	Grazing Land High	Grazing Land Low	Ag Land #	Ag Land Average	Ag Land High	Ag Land Low
BEAVERHEAD	15	15	$6.91	$14.00	$4.17	0			
BIG HORN	17	17	$9.65	$19.07	$4.17	0			
BLAINE	17	17	$6.90	$16.18	$4.17	1	26.00%	26.00%	26.00%
BROADWATER	8	8	$11.17	$21.86	$5.50	1	25.00%	25.00%	25.00%
CARBON	23	23	$10.51	$18.70	$4.27	5	31.73%	42.00%	25.00%
CARTER	8	8	$8.28	$13.17	$4.17	1	28.00%	28.00%	28.00%
CASCADE	27	24	$10.80	$44.68	$4.17	10	33.39%	40.00%	25.00%
CHOUTEAU	38	13	$7.87	$15.04	$4.17	21	35.52%	42.00%	30.00%
CUSTER	8	7	$6.40	$20.75	$4.23	1	34.00%	34.00%	34.00%
DANIELS	7	3	$4.17	$4.17	$4.17	7	35.86%	40.00%	34.00%
DAWSON	22	19	$8.14	$30.00	$4.17	15	33.98%	40.00%	30.00%
DEER LODGE	1	1	$5.43	$5.43	$5.43	0			
FALLON	4	4	$6.15	$9.17	$4.17	3	36.67%	50.00%	25.00%
FERGUS	36	33	$8.18	$14.17	$4.17	11	34.51%	50.00%	25.00%
FLATHEAD	0	0				0			
GALLATIN	14	14	$6.15	$29.97	$4.17	4	25.00%	25.00%	25.00%
GARFIELD	14	14	$8.53	$13.42	$4.24	1	30.00%	30.00%	30.00%
GLACIER	4	2	$9.36	$12.09	$9.21	2	34.17%	35.00%	33.33%
GOLDEN VALLEY	8	8	$10.70	$15.27	$5.27	4	31.67%	33.33%	30.00%
GRANITE	2	2	$9.78	$11.17	$7.71	0			
HILL	33	17	$7.77	$13.17	$4.17	23	34.37%	41.00%	25.00%
JEFFERSON	10	10	$8.26	$34.67	$4.28	0			
JUDITH BASIN	16	14	$10.93	$19.47	$6.51	9	37.88%	50.00%	27.63%
LAKE	0	0				0			
LEWIS & CLARK	17	17	$10.72	$18.17	$6.09	2	32.55%	40.10%	25.00%
LIBERTY	12	8	$10.45	$12.00	$6.91	8	35.12%	51.00%	30.00%
LINCOLN	0	0				0			
MADISON	9	9	$8.65	$13.18	$4.27	0			
McCONE	22	21	$7.15	$13.42	$4.17	2	29.17%	33.33%	25.00%
MEAGHER	6	6	$5.63	$173.89	$4.26	1	35.10%	35.10%	35.10%
MINERAL	1	1	$4.30	$4.30	$4.30	1	25.00%	25.00%	25.00%
MISSOULA	1	1	$5.18	$5.18	$5.18	0			
MUSSELSHELL	11	11	$7.41	$15.00	$4.17	1	30.00%	30.00%	30.00%
PARK	13	13	$10.63	$26.01	$6.27	5	31.33%	40.00%	25.00%
PETROLEUM	6	6	$7.90	$12.05	$4.17	0			
PHILLIPS	22	21	$7.25	$37.30	$4.17	4	37.50%	51.00%	25.00%
PONDERA	15	5	$10.93	$12.37	$7.50	10	37.58%	43.00%	27.00%
POWDER RIVER	3	3	$4.41	$4.81	$4.21	0			
POWELL	6	6	$10.75	$21.00	$4.50	1			
PRAIRIE	8	7	$9.95	$15.53	$6.00	2	30.00%	35.00%	25.00%
RAVALLI	7	7	$6.84	$14.17	$5.35	1	30.00%	30.00%	30.00%
RICHLAND	21	21	$9.10	$16.34	$4.17	8	37.08%	50.00%	30.00%
ROOSEVELT	9	6	$9.86	$20.97	$4.20	5	42.00%	50.00%	40.00%
ROSEBUD	27	27	$6.92	$13.30	$4.25	2	28.00%	30.00%	26.00%
SANDERS	3	3	$9.67	$26.20	$6.01	1	25.00%	25.00%	25.00%
SHERIDAN	16	14	$7.22	$12.29	$4.17	9	34.15%	42.00%	25.00%
SILVER BOW	1	1	$9.30	$9.30	$9.30	0			
STILLWATER	16	14	$9.24	$15.79	$6.00	6	35.83%	50.00%	25.00%
SWEET GRASS	11	11	$8.68	$15.00	$4.85	0			
TETON	15	15	$10.40	$22.17	$4.17	4	37.92%	60.00%	25.00%
TOOLE	27	20	$7.23	$12.03	$4.17	9	37.18%	50.00%	30.00%
TREASURE	4	4	$6.85	$9.17	$5.33	0			
VALLEY	21	17	$9.06	$17.00	$4.17	9	36.43%	41.60%	25.00%
WHEATLAND	18	18	$10.61	$20.00	$6.15	2	33.67%	34.00%	33.33%
WIBAUX	10	10	$8.73	$13.00	$4.17	5	34.66%	40.00%	33.33%
YELLOWSTONE	19	17	$9.06	$14.17	$4.17	7	33.33%	40.00%	25.00%

STATEWIDE SUMMARY

Total Bids	Grazing Land Total	Grazing Land Average	Grazing Land High	Grazing Land Low	Ag Land Total	Ag Land Average	Ag Land High	Ag Land Low
709	613	$8.34	$173.89	$4.17	224	32.91%	60.00%	25.00%

10/27/92

EPORT NO. 01
CSTLF001

TRUST LAND - LEASES AND ACREAGE BY AGREEMENT TYPE

CODE	AGREEMENT TYPE	TOTAL AGREEMENTS	TOTAL ACRES
1	GRAZING	5,698	3,397,555.151
2	GRAZING - COMPETITIVE BID	510	281,005.064
3	GRAZING - NEW/RENEWAL	5	3,200.000
100	AGRICULTURE AND GRAZING	1,893	942,285.055
101	AGRICULTURE & GRAZING - COMPETITIVE BID	166	80,042.350
200	AGRICULTURE	813	205,623.304
201	AGRICULTURE - COMPETITIVE BID	78	25,441.890
300	SPECIAL LEASES	901	9,713.597
301	SPECIAL LEASES - COMPETITIVE BID	51	971.125
303	FORESTRY AGRICULTURAL LICENSE	17	260.200
400	OIL & GAS LEASE	1,584	908,301.850
500	METALLIFEROUS	40	16,951.320
501	NON-METALLIFEROUS	22	6,764.340
502	COAL	15	6,548.090

PORT NO. 01
CSTLF001

TRUST LAND - LEASES AND ACREAGE BY AGREEMENT TYPE

CODE	AGREEMENT TYPE	TOTAL AGREEMENTS	TOTAL ACRES
600	EASEMENT/ROW	9,735	47,668.442
601	CERTIFICATE OF PURCHASE	64	31,901.840
	GRAND TOTALS:	20,592	5,964,333.618

PORT NO. 07
CSTLF001

ACREAGE BREAKDOWN FOR COMBINED AGRI./GRAZ. LEASES

		TOTAL ACRES
100	AGRICULTURE AND GRAZING	350,496.020
	AGRICULTURE ACRES	573,610.626
	GRAZING ACRES	6,697.890
	UNSUITABLE ACRES	11,273.449
	RESOURCE DEVELOPMENT ACRES	
101	AGRICULTURE & GRAZING - COMPETITIVE BID	37,784.710
	AGRICULTURE ACRES	41,013.780
	GRAZING ACRES	193.100
	UNSUITABLE ACRES	1,030.760
	RESOURCE DEVELOPMENT ACRES	

APPENDIX G. FIPS District Codes

APPENDIX G.

Table G-1. FIPS District Codes.

Code 10	Deerlodge, Flathead, Granite, Lake, Lincoln, Mineral, Missoula, Powell, Ravalli, Sanders.
Code 20	Blaine, Chouteau, Glacier, Hill, Liberty, Phillips, Pondera, Teton, Toole.
Code 30	Daniels, Dawson, Garfield, McCone, Richland, Roosevelt, Sheridan, Valley.
Code 50	Broadwater, Cascade, Fergus, Golden Valley, Judith Basin, Lewis & Clark, Meagher, Musselshell, Petroleum, Wheatland.
Code 70	Beaverhead, Gallatin, Jefferson, Madison, Silverbow.
Code 80	Bighorn, Carbon, Park, Stillwater, Sweet Grass, Treasure, Yellowstone.
Code 90	Carter, Custer, Fallon, Powder River, Prairie, Rosebud, Wibaux.

APPENDIX H. Variable List.

SAS

14:27 Friday, January 29, 1993 2

CONTENTS

PROCEDURE

Data Set Name: AGSTAT.C2ALT Type:
Observations: 639 Record Len: 2618
Variables: 143
Label:

-----Alphabetic List of Variables and Attributes-----

#	Variable	Type	Len	Pos	Format	Label
40	ACREHV0	Num	8	477		Acres of crop harvested on lease
44	ACREHV1	Num	8	505		Acres of crop harvested on lease
48	ACREHV2	Num	8	533		Acres of crop harvested on lease
52	ACREHV3	Num	8	561		Acres of crop harvested on lease
56	ACREHV4	Num	8	589		Acres of crop harvested on lease
39	ACREPL0	Num	8	469		Acres of crop planted on lease
43	ACREPL1	Num	8	497		Acres of crop planted on lease
47	ACREPL2	Num	8	525		Acres of crop planted on lease
51	ACREPL3	Num	8	553		Acres of crop planted on lease
55	ACREPL4	Num	8	581		Acres of crop planted on lease
31	ACRES	Num	8	337		Acres of public lease iteration
18	ACRESC00	Num	8	141		Number of Acres in Lease
20	ACRESC01	Num	8	157		Number of Acres in Lease
22	ACRESC02	Num	8	173		Number of Acres in Lease
24	ACRESC03	Num	8	189		Number of Acres in Lease
26	ACRESC04	Num	8	205		Number of Acres in Lease
28	ACRESC05	Num	8	221		Number of Acres in Lease
64	AMNTCHR	Num	8	725		The rate of the basis
77	BDSTOTH	Char	80	1045		Description of Other Sharing Arrgmt BdSt
104	BIDHIGH	Num	8	1907	TYPE_4F.	Bid Higher if you controlled Public Rec.
76	BLDGSTR	Num	8	1037	TYPE_15F.	Services for Buildings and Machinery Sto
88	BOWNBOS	Num	8	1493	TYPE_4F.	Can he manage land as wants
111	CASHDRY0	Num	8	2172		Going Market Rate for Dryland Cash Lease
116	CASHDRY1	Num	8	2207		Going Market Rate for Dryland Cash Lease
121	CASHDRY2	Num	8	2242		Going Market Rate for Dryland Cash Lease
126	CASHDRY3	Num	8	2277		Going Market Rate for Dryland Cash Lease
131	CASHDRY4	Num	8	2312		Going Market Rate for Dryland Cash Lease
112	CASHIRR0	Num	8	2180		Going Market Rate for Irrigated Cash Lea
117	CASHIRR1	Num	8	2215		Going Market Rate for Irrigated Cash Lea
122	CASHIRR2	Num	8	2250		Going Market Rate for Irrigated Cash Lea
127	CASHIRR3	Num	8	2285		Going Market Rate for Irrigated Cash Lea
132	CASHIRR4	Num	8	2320		Going Market Rate for Irrigated Cash Lea
36	CMNTS0	Char	80	377		Location limiting marketability Desc
89	CMNTS01	Char	150	1501		Can he manage land as wants comments
93	CMPTNG	Num	8	1675	TYPE_4F.	Competing bid submitted?
3	COUNTY	Num	8	21		
37	CROPINT	Num	8	457		Crops Grown on Lease July 1 introduction
14	CROPLAND	Num	8	109		Acres of cropland
109	CROPNMBR	Num	8	2161		Number of Major Crops in area
38	CROPTY0	Char	4	465		Crop type on lease
42	CROPTY1	Char	4	493		Crop type on lease
46	CROPTY2	Char	4	521		Crop type on lease
50	CROPTY3	Char	4	549		Crop type on lease
54	CROPTY4	Char	4	577		Crop type on lease
110	CROPTY30	Char	3	2169		Major Crop types in area

APPENDIX H. Variable List (Cont'd).

115	CROPTY31	Char	3	2204		Major Crop types in area
120	CROPTY32	Char	3	2239		Major Crop types in area
125	CROPTY33	Char	3	2274		Major Crop types in area
130	CROPTY34	Char	3	2309		Major Crop types in area
15	CRP	Num	8	117		Acres of CRP
141	CT0	Char	4	2606		
142	CT1	Char	4	2610		
143	CT3	Char	4	2614		
34	DISTANC	Num	8	361		Surrounded Inholding UNfenced Distance
2	DISTRICT	Num	8	13		
92	DRTHPRF	Num	8	1667	TYPE_22F.	Performance in Drought Conditions
59	DRYLAND	Num	8	613		Percentage of dryland on lease
5	EXPLAIN	Num	8	37		Screens to be active yet
6	EXPLAIN2	Num	8	45		Screens to be INactive
135	FAIRPRCE	Num	8	2344	TYPE_4F.	Fair price state grazing land
33	FENCED	Num	8	353	TYPE_4F.	Surrounded Inholding Fenced
84	FERTILZ	Num	8	1389	TYPE_19F.	Services for Pest Control
70	FNCECNS	Num	8	773	TYPE_12F.	Services for Fence Construction
72	FNCEMAI	Num	8	861	TYPE_13F.	Services for Fence Maintenance
71	FNCNOTH	Char	80	781		Description of Other Sharing Arrgmt Cnst
73	FNMNOTH	Char	80	869		Description of Other Sharing Arrgmt Mntc
103	FRSTYEA	Num	8	1899	TYPE_4F.	First Year for Public Access to Hunt or
85	FTLZOTH	Char	80	1397		Description of Other Sharing Arrgmt ftlz
79	GNSTOTH	Char	80	1133		Description of Other Sharing Arrgmt gnst
78	GRNSSTR	Num	8	1125	TYPE_16F.	Services for Grain Storage
67	HELD	Num	8	749		Number of years lease held
99	HUNTFSH0	Num	8	1795	TYPE_4F.	Hunting or Fishing in prior years?
30	ID	Num	8	329	TYPE_23F.	Identify where lease is from for leaseit
94	IFNOW000	Num	8	1683	TYPE_24F.	Reasons why no bid submitted
95	IFNOW001	Num	8	1691	TYPE_24F.	Reasons why no bid submitted
96	IFNOW002	Num	8	1699	TYPE_24F.	Reasons why no bid submitted
97	IFNOW003	Num	8	1707	TYPE_24F.	Reasons why no bid submitted
75	IRGTOTH	Char	80	957		Description of Other Sharing Arrgmt Irrg
91	IRRGSYT	Num	8	1659	TYPE_21F.	Effectiveness of Irrigation System
74	IRRIGA	Num	8	949	TYPE_14F.	Services for Irrigation Systems
61	IRRIGAT	Num	8	629		Percentage of irrigated on lease
65	JSTPRD	Num	8	733	TYPE_4F.	Just Productive Acres
102	LEGLAC	Num	8	1891	TYPE_4F.	Legally Accessible to State land parcel?
66	LGTHTE	Num	8	741		Number of years for lease
13	LIFMACRE	Num	8	101		Land in Farm
35	LMTSMKT	Num	8	369	TYPE_4F.	Location limiting marketability
1	LSF_ID	Char	9	4		Id of operation.
108	MKTINTRO	Num	8	2153		Average Market Rate Introduction
86	NOXSWEE	Num	8	1477	TYPE_4F.	Noxious Weed Problem?
87	NOXWDCS	Num	8	1485		Cost of Noxious Weed Control
17	NUMBER0	Num	8	133		Number of Leases
19	NUMBER1	Num	8	149		Number of Leases
21	NUMBER2	Num	8	165		Number of Leases
23	NUMBER3	Num	8	181		Number of Leases
25	NUMBER4	Num	8	197		Number of Leases
27	NUMBER5	Num	8	213		Number of Leases
29	OTHLSDSC	Char	100	229		Other Pub Agncy Description
63	OTHRDES	Char	80	645		Description of Other charge
107	OTHRDES6	Char	80	2073		Description of Other charge
98	OTHRDSC0	Char	80	1715		Description for OTHER Reason why no bid
101	OTHRDSC2	Char	80	1811		Description for OTHER recent status
140	OTHRDSC4	Char	80	2526		Description of Other action
4	OUTOFBUS	Num	8	29	TYPE_4F.	

APPENDIX H. Variable List (Cont'd).

8	OWNED	Num	8	61		Acres owned
137	PCTOFAVG	Num	8	2502		State schl trust land as percent of avg.
82	PESTCNT	Num	8	1301	TYPE_18F.	Services for Pest Control
11	PIGA	Num	8	85		PIGA Acres
90	PRDCTVT	Num	8	1651	TYPE_20F.	Rate Productivity
83	PSCNOTH	Char	80	1309		Description of Other Sharing Arrgmt PsCn
138	RANK	Num	8	2510	TYPE_27F.	Comparison rank of fed, state, prvte lea
100	RCNTSTA	Num	8	1803	TYPE_25F.	Recent Status of Public Access?
105	REASON	Char	150	1915		Reason no Higher Bid
136	REASON2	Char	150	2352		Reason state lease should be below mkt
68	RELATIV	Num	8	757	TYPE_4F.	Lease with Relative
9	RENTFROM	Num	8	69		Acres rented from
10	RENTTO	Num	8	77		Acres rented out
7	RESPNDNT	Num	8	53	TYPE_8F.	Respondent code.
113	SHREDRY0	Num	8	2188		Going Market Rate for Dryland Crop Share
118	SHREDRY1	Num	8	2223		Going Market Rate for Dryland Crop Share
123	SHREDRY2	Num	8	2258		Going Market Rate for Dryland Crop Share
128	SHREDRY3	Num	8	2293		Going Market Rate for Dryland Crop Share
133	SHREDRY4	Num	8	2328		Going Market Rate for Dryland Crop Share
114	SHREIRR0	Num	8	2196		Going Market Rate for Irrigated Crop Sha
119	SHREIRR1	Num	8	2231		Going Market Rate for Irrigated Crop Sha
124	SHREIRR2	Num	8	2266		Going Market Rate for Irrigated Crop Sha
129	SHREIRR3	Num	8	2301		Going Market Rate for Irrigated Crop Sha
134	SHREIRR4	Num	8	2336		Going Market Rate for Irrigated Crop Sha
58	SMRFALL	Num	8	605		Acres of Summer Fallow on Lease July 1
60	SUBIRGT	Num	8	621		Percentage of subirrigated on lease
32	SURROUN	Num	8	345	TYPE_4F.	Surrounded Inholding
69	SVCEINT	Num	8	765		
12	TOTLACRE	Num	8	93		Acres Operated
62	TYPECHR	Num	8	637	TYPE_11F.	How are charges reckoned
106	TYPECHR6	Num	8	2065	TYPE_26F.	Most common method of charging
16	TYPEOFOP	Num	8	125		Type of Operation
81	WDCNOTH	Char	80	1221		Description of Other Sharing Arrgmt WdCn
80	WEEDCNT	Num	8	1213	TYPE_17F.	Services for Weed Control
139	WOULDYOU	Num	8	2518	TYPE_28F.	Would you submit bid against neighbor?
41	YIELDA0	Num	8	485		Yield of crop harvested on lease
45	YIELDA1	Num	8	513		Yield of crop harvested on lease
49	YIELDA2	Num	8	541		Yield of crop harvested on lease
53	YIELDA3	Num	8	569		Yield of crop harvested on lease
57	YIELDA4	Num	8	597		Yield of crop harvested on lease

APPENDIX I. Logit Analysis of Willingness to Pay for Control of Recreational Access.

SAS 14:58 Friday, January 29, 1993 1

CATMOD PROCEDURE

Response: BIDHIGH
Weight Variable: None
Data Set: BID

Response Levels (R)= 2
Populations (S)= 5
Total Frequency (N)= 123
Observations (Obs)= 123

POPULATION PROFILES

Sample	LNBID	Sample Size
1	0	24
2	0.6931471806	33
3	1.0986122887	23
4	1.3862943611	22
5	1.6094379124	21

RESPONSE PROFILES

Response	BIDHIGH
1	NO
2	YES

RESPONSE FREQUENCIES

Sample	Response Number 1	2
1	23	1
2	24	9
3	21	2
4	21	1
5	19	2

RESPONSE PROBABILITIES

Sample	Response Number 1	2
1	0.95833	0.04167
2	0.72727	0.27273
3	0.91304	0.08696
4	0.95455	0.04545
5	0.90476	0.09524

APPENDIX I. Logit Analysis of Willingness to Pay for Control of Recreational Access (Cont'd).

MAXIMUM LIKELIHOOD ANALYSIS

Iteration	Sub Iteration	-2 Log Likelihood	Convergence Criterion	Parameter Estimates 1	2
0	0	170.51421	1.0000	0	0
1	0	94.3014	0.4470	-1.4467	-0.0716
2	0	91.166167	0.0332	-1.7838	-0.1380
3	0	91.104389	0.000678	-1.8260	-0.1636
4	0	91.104344	4.9748E-7	-1.8265	-0.1649
5	0	91.104344	3.692E-13	-1.8265	-0.1649

MAXIMUM LIKELIHOOD ANALYSIS OF VARIANCE TABLE

Source	DF	Chi-Square	Prob
INTERCEPT	1	12.73	0.0004
LNBID	1	0.11	0.7378
LIKELIHOOD RATIO	3	9.18	0.0270

ANALYSIS OF MAXIMUM LIKELIHOOD ESTIMATES

Effect	Parameter	Estimate	Standard Error	Chi-Square	Prob
INTERCEPT	1	-1.8265	0.5120	12.73	0.0004
LNBID	2	-0.1649	0.4926	0.11	0.7378

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